Boronia sect. *Valvatae* (Benth.) Engl. (Rutaceae) in Queensland, Australia

Marco F. Duretto

Summary

Duretto, Marco F. (1999). *Boronia* sect. *Valvatae* (Benth.) Engl. (Rutaceae) in Queensland, Australia. *Austrobaileya* 5(2): 263-298. A numerical analysis, using phenetic methods, was undertaken on the *Boronia rosmarinifolia* species complex. Four taxa were identified, three of which are new and are described here as *B. forsteri*, *B. splendida* and *B. palasepala*. Nine other new taxa belonging to *Boronia* sect. *Valvatae* (Benth.) Engl. (*B. bella*, *B. duiganiae*, *B. excelsa*, *B. foetida*, *B. hoipolloi*, *B. jensziae*, *B. odorata*, *B. quinkanensis* and *B. squamipetala*) are also described. All new taxa are confined to Queensland. A key to *Boronia* sect. *Valvatae* in Queensland is provided.

Keywords: *Boronia* sect. *Valvatae*, *Boronia*, Rutaceae, *Boronia bella*, *Boronia duiganiae*, *Boronia excelsa*, *Boronia foetida*, *Boronia forsteri*, *B. hoipolloi*, *Boronia jensziae*, *Boronia odorata*, *Boronia palasepala*, *Boronia quinkanensis*, *Boronia rosmarinifolia*, *Boronia splendida*, *Boronia squamipetala*.

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Introduction

As the 'Flora of Australia' account of *Boronia* Sm. sect. *Valvatae* (Benth.) Engl. was being prepared it became apparent that *B. rosmarinifolia* A.Cunn. ex Endl., as currently circumscribed, included a number of taxa. Endlicher (1837) described *B. rosmarinifolia* from material that was collected by Alan Cunningham from Peel's Island, Moreton Bay, Queensland (Fig. 1). *Boronia rosmarinifolia* is characterised by simple, sessile leaves that are hirsute abaxially, glabrous adaxially and have recurved to revolute margins. Specimens with these features occur in coastal areas from Bundaberg (Queensland) to Grafton (New South Wales) and inland to the Carnarvon Range area of Queensland (Fig. 1). In comparison with *B. rosmarinifolia* sensu stricto (coastal populations), plants previously included in *B. rosmarinifolia* from the Carnarvon Range and Robinson Gorge have smaller leaves and flowers; and those from the Monto and Dalby-Chinchilla–Haldon areas are taller and have larger leaves and flowers as noted by Lebler (1972). To ascertain whether these forms warrant taxonomic recognition a numerical analysis, using phenetic methods, was undertaken.

An apparently undescribed taxon from the Pilliga Scrub (western slopes, New South Wales) has been known in the literature as *B.* sp. aff. *rosmarinifolia* B (Jacobs & Pickard 1981; Weston 1990; Weston & Porteners 1991). Though superficially similar to *B. rosmarinifolia*, it appears to be more closely related to *B. glabra* (Maiden & Betche) Cheel which is also found in the Pilliga Scrub (Duretto 1995, submitted), though it occupies a different local habitat (D. Mackay, NE, pers. comm.) The status of this form is being assessed by D. Mackay and will not be dealt with further in this paper.

There are a number of other Queensland *Boronia* taxa with simple leaves that have been assigned previously to *B. rosmarinifolia* or *B.* sp. aff. *B. rosmarinifolia* (e.g. in Stanley & Ross 1983). Most of these taxa have broad, flat, simple leaves (at least on older plants) and are quite distinct from *B. rosmarinifolia* and other *Boronia* species. These are described here as *B. bella* Duretto, *B. excelsa* Duretto, *B. foetida* Duretto, *B. jensziae* Duretto and *B. odorata* Duretto. To complete the revision of *Boronia* sect. *Valvatae* in Queensland, four pinnate leaved

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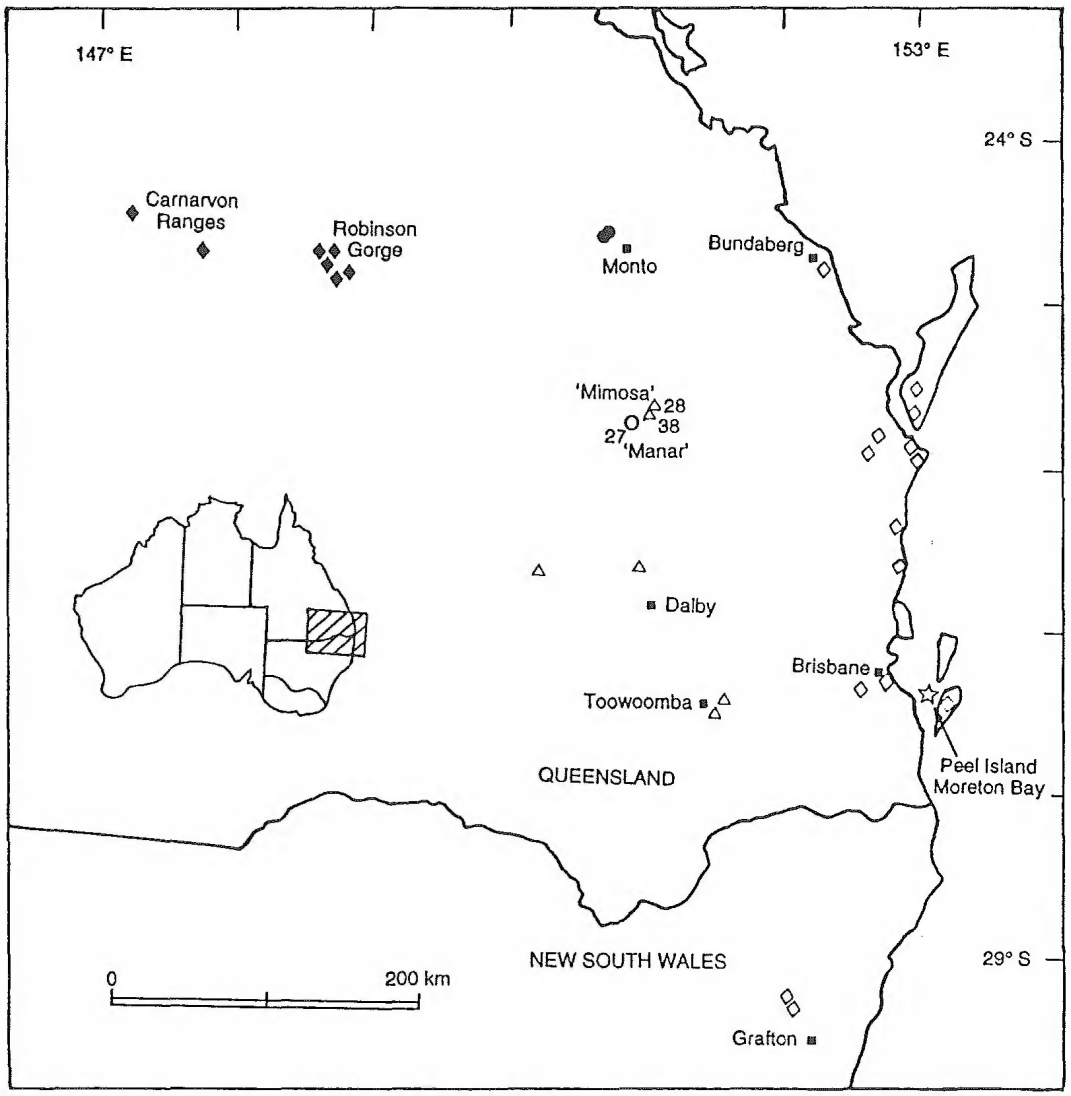

Fig. 1. Distribution of collection localities of specimens used in analysis of *Boronia rosmarinifolia* species complex (1–45); *Boronia rosmarinifolia* Group A (◇); *B. forsteri* Group B (◆); *B. splendida* pro parte Group C (△); *B. palasepala* Group D (●); *B. splendida* pro parte Group E (○).

species (*B. duiganiae* Duretto, *B. hoipolloi* Duretto, *B. quinkanensis* Duretto and *B. squamipetala* Duretto) are also recognised and described here.

A specimen assignable to *B. ledifolia* (Vent.) DC. from the Pioneer River area of central Queensland (Pioneer River, Queensland, Dr Griffith, 1889 [MEL]) is the only collection of a *Boronia* species that has been made in the Mackay region seen by the author. *Boronia ledifolia*, belonging in *Boronia* sect. *Valvatae*, is found in New South Wales and Victoria. The above specimen is therefore presumed to be mislabelled and may have been collected in Victoria where Dr Griffith had travelled (Duretto 1995, submitted), and this species is hence not dealt with further here. The taxon in southern Queensland called *B. ledifolia* by Neldner (1992), Ross (1994) and Forster (1997) is probably either *B. duiganiae* or *B. odorata*; the taxon in north-eastern Queensland

called by that name by Tennison-Woods (1882) is probably a species of *Zieria* Sm. as it was ascribed very small flowers and trifoliolate leaves.

Materials and Methods

Material

Herbarium specimens from AD, BRI, CANB, DNA, MBA, MEL, MELU, NSW, PERTH, QRS and TCD were made available to the author. Herbarium abbreviations follow Holmgren et al. (1990). These specimens were augmented by material collected in the field. A list of all specimens examined is available from the author.

Anatomy

The central portion of the leaves of all taxa was sectioned transversely. Material to be sectioned was fixed in Mirsky's fixative (MAA) or 70% ethanol. If fresh material was not available, herbarium samples were re-hydrated by being placed in water with a small amount of detergent, brought to the brink of boiling, left simmering for one hour and soaked overnight before fixing in MAA. All fixed material was then placed in 70% ethanol overnight, dehydrated through a graded ethanol series up to 100% ethanol, infiltrated with 100% LR-White (London Resin) through a resin/ethanol series, and polymerised at 60°C. Sections 2 µm in thickness were cut on a Reichert Ultracut ultra-microtome, stained with 0.05% toluidine blue solution (pH 4.4) and observed and photographed using an Olympus BHS compound microscope. Anatomical features observed are described in the taxonomic descriptions below. Voucher specimens for leaf anatomy are listed in Appendix 1.

Scanning electron microscopy

Trichomes on leaves and petals, and seed surfaces were surveyed for all taxa (where material was available) using a scanning electron microscope. Dry leaves, petals and seeds were mounted on stubs using double sided or carbon tape with conductive carbon paint, coated with gold using an Edwards Sputter Coater S150B and examined and photographed at 5KV using a JEOL 840 Scanning Electron Microscope equipped with a lanthanum hexaboride filament. All photographs of seeds were of central areas on a lateral side. Trichome and seed characters are described in the taxonomic descriptions below.

Phenetic Analysis of the *B. rosmarinifolia* species Complex

Characters

Eleven characters (Table 1) were scored for 45 herbarium specimens (Table 2) covering the geographic range of the *B. rosmarinifolia* species complex. Scores are an average of 10 measurements (where 10 organs were available) and ratios are the average of the individual ratios of the 10 organs measured. There are some problems associated with the use of ratios in phenetic analyses (see Duretto & Ladiges 1997 and references therein for discussion): here ratios are used as a means of quantifying and standardizing leaf and sepal shape (characters 4 and 7).

Table 1. Morphological characters used in the phenetic analysis of the *Boronia rosmarinifolia* species complex.

1	Style glabrous/hirsute, 0/1
2	Terminal leaf length (TLL) (mm)
3	Terminal leaf width (TLW) (mm)
4	TLW/TLL
5	Sepal length (SL) (mm)
6	Sepal width (SW) (mm)
7	SW/SL
8	Petal length (mm)
9	Petal width (mm)
10	Stellate hair rays on sepals <0.25 mm long/±0.5 mm long, 0/1
11	Anther appendage recurved/erect, 0/1

Table 2. Data used in the phenetic analysis of the *Boronia rosmarinifolia* species complex. Principal collector only given. For quantitative characters, mean values are given (see Table 1).

Specimen Number	Collector & number (or date)	Herbarium & sheet number	Character 1	2	3	4	5	6	7	8	9	10	11
1	Smith 7	MEL (MEL259152)	0	19.3	2.7	0.14	2.5	1.5	0.60	7.0	3.5	0	0
2	Ross 3196	MEL (MEL1552623)	0	15.7	1.9	0.12	2.5	2.0	0.80	6.5	3.5	0	0
3	Jobson 930	MEL (MEL221851)	0	18.6	1.8	0.10	3.0	2.5	0.83	6.0	3.0	0	0
4	Parish, 6.x.1982	MEL (MEL626024)	0	24.3	4.1	0.17	2.5	1.5	0.60	7.0	3.5	0	0
5	Walsh 1399	MEL (MEL1545124)	0	22.3	2.6	0.12	3.0	2.5	0.83	7.0	3.8	0	0
6	Baxter 1132	NSW (NSW243819)	0	19.8	2.1	0.10	3.0	2.0	0.67	6.0	3.3	0	0
7	Bird, 7.vii.1990	BRI (AQ472316)	0	18.7	2.5	0.13	4.0	2.5	0.63	6.0	3.5	0	0
8	Willis, 10.vii.1982	MEL (MEL628666)	0	19.5	1.7	0.09	4.0	2.5	0.63	7.0	3.3	0	0
9	Olsen 330	NSW (NSW243826)	0	16.1	1.7	0.10	2.5	1.5	0.60	6.0	3.0	0	0
10	McDonald 476	BRI (AQ117773)	0	19.0	2.0	0.11	3.0	2.0	0.67	6.5	2.7	0	0
11	White, 12.viii.1930	NSW (NSW243829)	0	16.6	1.8	0.12	3.0	2.0	0.67	6.5	3.0	0	0
12	Moriarty 415	CANB (CANB253236)	0	24.6	2.0	0.08	4.0	2.5	0.63	8.0	3.3	0	0
13	Duretto 259	MEL (MEL2036432)	0	12.8	2.2	0.17	2.0	1.5	0.75	6.0	4.0	0	0
14	Duretto 256	MEL (MEL2036427)	0	12.8	2.1	0.17	2.5	2.0	0.80	5.5	4.0	0	0
15	Duretto 254	MEL (MEL2036425)	0	14.8	2.9	0.20	2.5	2.0	0.80	6.0	4.0	0	0
16	Duretto 257	MEL (MEL2036428)	0	12.7	2.5	0.20	2.5	1.5	0.60	6.0	4.0	0	0
17	Duretto 258	MEL (MEL2036430)	0	21.6	4.1	0.19	3.0	2.0	0.67	6.5	4.0	0	0
18	Grieves, 22.vii.1979	NSW (NSW243816)	0	19.8	1.7	0.08	3.5	2.5	0.71	7.0	3.8	0	0
19	Foreman 907	MEL (MEL1539697)	0	19.5	2.4	0.12	4.0	2.0	0.50	8.0	4.0	0	0
20	Duretto 276	MEL (MEL2036609)	0	30.0	3.7	0.12	4.5	3.5	0.78	8.0	5.0	1	0
21	Duretto 277	MEL (MEL2036610)	0	26.0	2.9	0.11	4.0	2.5	0.63	8.5	4.5	1	?
22	Duretto 275	MEL (MEL2036608)	0	28.2	4.0	0.14	4.5	3.5	0.78	8.0	5.0	1	?
23	Duretto 279	MEL (MEL2036614)	0	30.0	3.5	0.12	3.5	2.5	0.71	8.0	5.0	1	?
24	Forster 6906	BRI (AQ472561)	0	30.9	4.7	0.16	5.0	4.0	0.80	10.0	6.0	1	?
25	Forster 6961	BRI (AQ472512)	0	30.2	4.3	0.15	5.0	4.0	0.80	9.0	5.5	1	0
26	Martensz 1014	CANB (CANB284160)	0	24.0	2.7	0.12	4.0	3.0	0.75	9.0	5.5	1	0
27	Forster 4647	BRI (AQ408650)	1	22.5	2.4	0.11	6.0	4.0	0.67	10.0	6.0	1	0
28	Forster 2243	BRI (AQ441712)	0	24.0	1.0	0.04	3.5	2.0	0.66	?	?	0	0
29	Forster 4762	MEL (MEL1575271)	0	35.6	2.0	0.06	3.0	2.0	0.67	10.0	6.0	0	0
30	Shoobridge, 29.ix.1964	BRI (AQ15118)	0	19.3	1.3	0.07	4.0	2.5	0.63	8.5	5.0	0	0
31	Williams 84159	BRI (AQ416779)	1	18.3	1.2	0.07	4.0	2.5	0.63	10.0	5.5	0	0
32	Smith 14102	BRI (AQ403268)	1	17.9	1.1	0.06	4.0	2.0	0.50	9.0	5.0	0	0
33	Duretto 337	MEL (MEL2036656)	1	18.1	1.9	0.11	4.0	3.0	0.75	8.5	5.0	0	0
34	Duretto 339	MEL (MEL2036657)	1	19.3	1.4	0.07	3.5	2.0	0.57	8.0	5.0	0	0
35	Duretto 338	MEL (MEL2044555)	1	19.8	1.3	0.07	3.5	2.0	0.57	8.5	5.0	0	0
36	Duretto 342	MEL (MEL2036660)	1	18.8	1.2	0.06	3.5	2.0	0.57	8.0	4.5	0	0
37	Shoobridge, 30.ix.1964	CANB (CBG15711)	0	28.2	1.9	0.07	4.5	3.0	0.67	10.0	6.5	0	0
38	Forster 11202	MEL (MEL 2049143)	1	25.9	2.1	0.08	4.5	3.0	0.67	11.0	6.0	0	0
39	Forster 11235	MEL (MEL 2049140)	0	15.1	2.6	0.17	3.0	1.5	0.50	5.5	2.0	0	1
40	Forster 11453	MEL (MEL 2049118)	0	19.1	3.1	0.16	2.5	1.5	0.60	5.0	2.0	0	1
41	Forster 11429	MEL (MEL 2049141)	0	15.7	2.7	0.18	2.5	1.5	0.60	5.0	2.5	0	1
42	Forster 11244	MEL (MEL 2049142)	0	17.2	2.7	0.16	2.5	1.5	0.60	4.5	2.0	0	1
43	Gittens 2745	BRI (AQ264152)	0	19.0	1.9	0.10	2.5	1.5	0.60	5.0	2.5	0	1
44	Thomas 138	CANB (CBG8900796)	0	12.4	2.6	0.21	2.0	1.0	0.50	5.5	2.5	0	1
45	Williams 86097	BRI (AQ406813)	0	12.0	2.1	0.18	2.0	1.0	0.50	4.0	1.8	0	1

Most characters are self explanatory but a few require clarification.

For characters 5 to 9, lengths, widths and ratios of perianth members proved difficult to measure accurately due to shrinkage of organs while drying, and their haphazard orientation on the herbarium sheet. Usually only a small number of these organs could be measured with any confidence on any herbarium specimen so measurements cited here should be treated as minimum values. Sepals and petals were measured on flowers without fruit as these organs enlarge during fruit development in most members of *Boronia* sect. *Valvatae*.

For character 10, most specimens had multiangular stellate hairs with rays that were too small to measure confidently as they were much less than 0.25 mm long. Specimens 20 to 27, though, have hairs with rays that reach 0.5 mm in length. As there was no gradation between these states, this numerical character was scored as a binary character (Table 1).

Data Analysis

All data sets were analysed using PATN (Belbin 1987) following the methodology outlined in

Duretto & Ladiges (1997). Data were range standardised before Manhattan dissimilarity measures were calculated. For cluster analysis, both flexible UPGMA (unweighted pair group arithmetic averages) and flexible WPGMA (weighted pair group arithmetic averages) were utilised as fusion strategies. Data were ordinated in three dimensions using the multidimensional scaling, MDS, KYSP algorithm (Kruskal et al. 1973). The Hybrid option of Faith et al. (1987) was chosen. Twenty different random starting points were used for each analysis and the run with the lowest stress value is shown. Character correlations with the ordination vectors were calculated using the PCC function of PATN. Minimum spanning trees (MST) were also calculated.

Taxon descriptions

Descriptive terminology follows Theobald *et al.* (1979) and Hewson (1988) for hairs, Briggs & Johnson (1979) and Weston (1990) for inflorescence structure, and Murley (1951), Powell & Armstrong (1980) and Barthlott (1984) for seed surfaces. Conservation codes follow the format of Briggs & Leigh (1996).

Results

Analysis 1 (all specimens)

Analysis one was based on the entire data set (45 specimens x 10 characters; Table 2). Five groups, A to E, are recognisable in both the UPGMA (Fig. 2) and WPGMA (Fig. 3) classifications, in the ordination (Fig. 4 & 5) and in the MST (Fig. 6). Group A includes all coastal collections (specimens 1–19); Group B includes all specimens collected from Robinson Gorge and Carnarvon Ranges (specimens 39–45); Group C includes collections from the Dalby and Haldon areas (specimens 29–37), specimen 28 from near the 'Mimosa' Homestead and specimen 38 from near the 'Beeron' homestead; Group D includes all collections from Coominglah State Forest (specimens 20–26); Group E is comprised of the single specimen 27 from near the 'Manar' Homestead (Fig. 1).

In the UPGMA classification (Fig. 2), Group A fuses first with Group C and then with Group B, while in the WPGMA classification (Fig. 3), Group A fuses with Group B. In the MST (Fig. 6), Groups B, C and D connect to Group A at different places. Group E fuses with Group D in both classifications (Fig. 2 & 3). This larger group of D with E is the most dissimilar in the UPGMA (Fig. 2) but fuses with Group C in the WPGMA (Fig. 3). Group E is isolated but closer to Group D in the ordination (Fig. 4 & 5), but joins members of Group C in the MST (Fig. 6). Characters highly correlated with the vectors are 2, 5 and 6 for vector 1, 1, 3 and 4 for vector 2, and 7–9 for vector 3.

Analysis 2 (specimens 20–38, characters 1–7, 10)

For the five groups (A–E) recognised in Analysis 1, the relationships between Groups C, D and E (specimens 20–38) were ambiguous and so a data set containing specimens 20 to 38 and characters 1–7 and 10 was reanalysed. (Invariant characters in the data set were excluded from this analysis.)

Analysis 2 confirmed that Groups C, D and E of Analysis 1 (Fig. 2–6) are distinct. Group E fuses with Group D in both classifications (not shown). Though isolated in the ordination (Fig. 7, 8), Group E is closer to Group D (Fig. 8). In the MST (not shown) Group E is well within Group C, as was the case in Analysis 1 (Fig. 6). Characters highly correlated with the vectors are 3 and 4 for vector 1, 5 for vector 2, and 7 and 10 for vector 3.

Taxonomic interpretation

On the basis of the above analyses (Fig. 2–8), four taxa, corresponding to Groups A (specimens 1–19), B (specimens 39–45), C (specimens 28–38) and D (specimens 20–26), are recognised at the specific level. Results on the position of Group E (specimen 27) are conflicting. Geographically, the closest specimens to Group E are specimens 28 and 38 of Group C (Fig. 1) and in the MST (Fig. 6) specimen 27 links with specimen 38. Both these specimens have hirsute styles. As Groups C, D and E do not chain in the MST there is no evidence of a cline. Specimen 27 differs from members of Group C in having wider leaves and larger sepals, and from members of Group

D by having a hirsute style; a feature that is variable in Group C. Given this pattern of variation Group E is here considered to be conspecific with Group C.

The members of Group A are characterised by short hairs, recurved anther appendage and floral parts that are larger than those in members of Group B but smaller than those in members of Groups C/E and D (Table 3). The members of Group B are characterised by small floral parts, an erect anther appendage and short hairs. The members of Group C (including Group E) are characterised by the extremely narrow (usually recurved) leaves, large floral parts and short hairs. The members of Group D are characterised by wide leaves, comparatively large floral parts and long hairs. Characters not used in these analyses that confirm these results include: members of Group B have hirsute fruit unlike the other groups (except for two specimens of Group A); and members of Group D have minute anther appendages unlike members of Groups B and C, this character being variable in members of Group A.

Coastal specimens (Group A) retain the name *B. rosmarinifolia* as the distribution of this group of specimens includes the type locality (Peel Island, Moreton Bay, Queensland) of that name and these specimens match the diagnosis given by Endlicher (1837) for this species. Groups B, C (including E) and D are here described as *B. forsteri* Duretto, *B. splendida* Duretto and *B. palasepala* Duretto respectively.

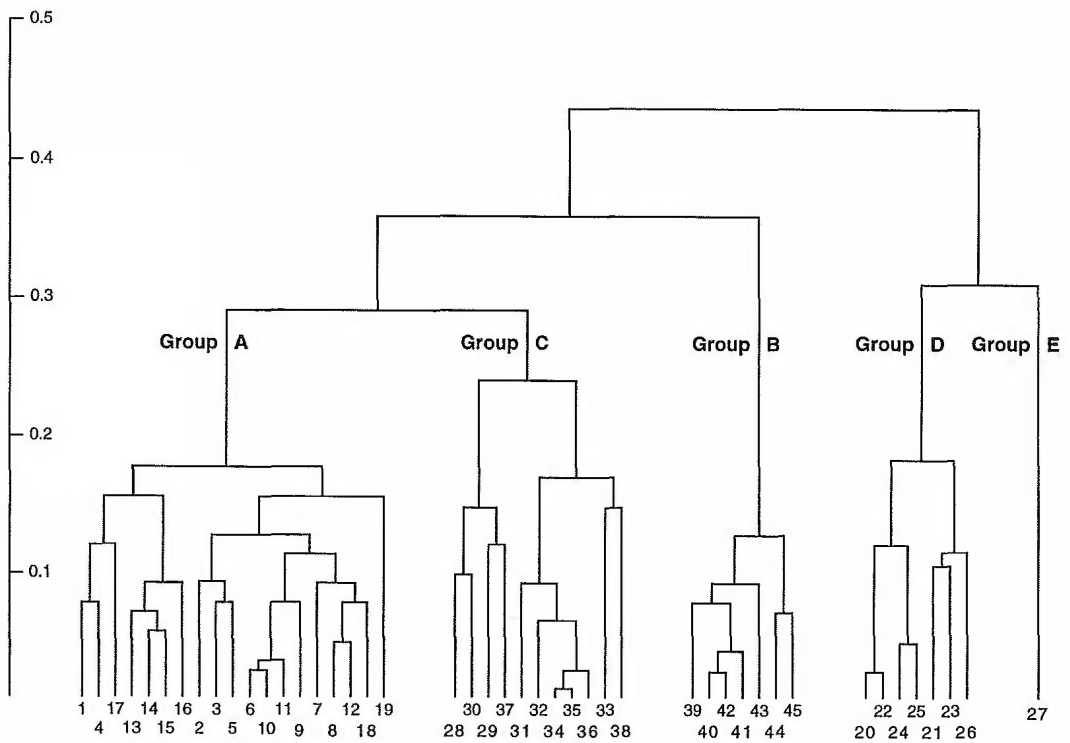

Fig. 2. Unweighted pair group arithmetic averages (UPGMA) classification, analysis one, all specimens.

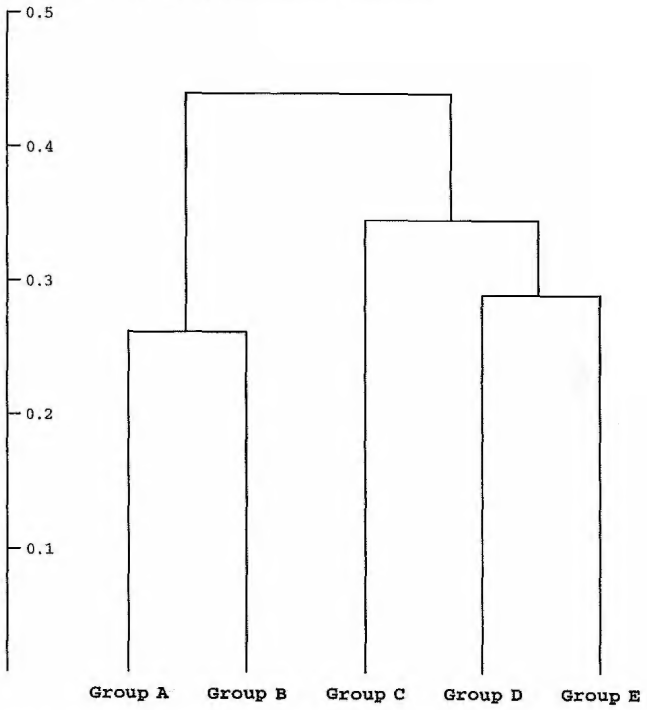

Fig. 3. Weighted pair group arithmetic averages (WPGMA) classification, analysis one, all specimens.

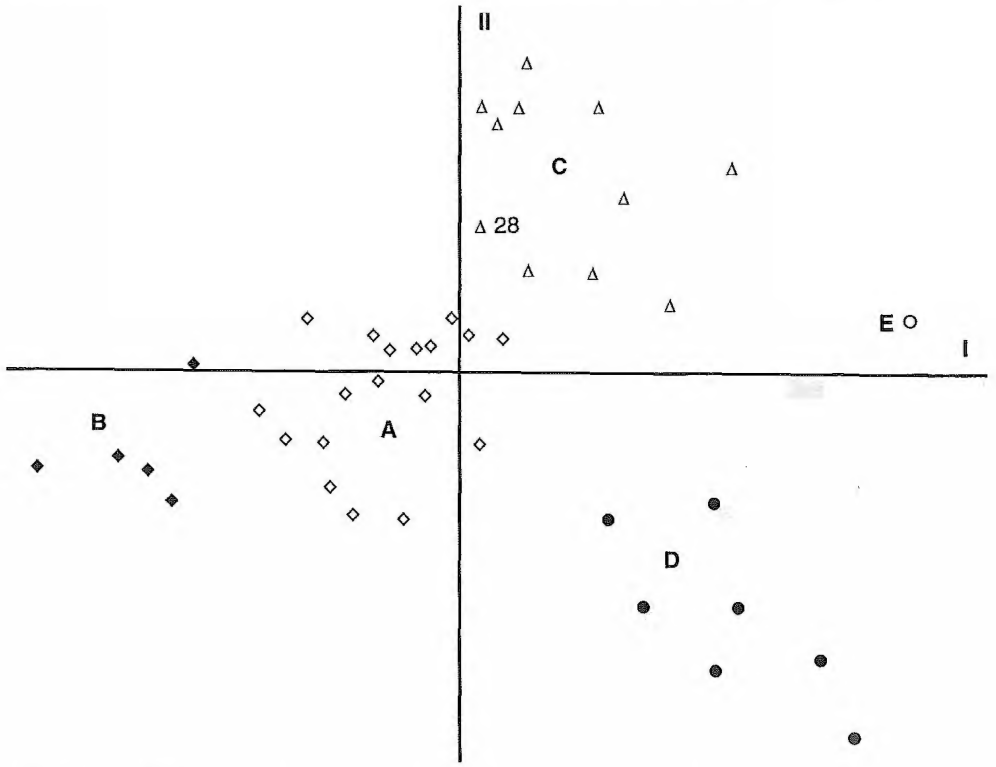

Fig. 4. Ordination (KYSP), vector 1 verses vector 2, analysis one, all specimens. *Boronia rosmarinifolia,* Group A(◇); *B. forsterii,* Group B (◆); *B. splendida* (pro parte), Group C (△); *B. palasepala*, Group D (●); *B. splendida* (pro parte), Group E (○). Specimen 28, Group C numbered.

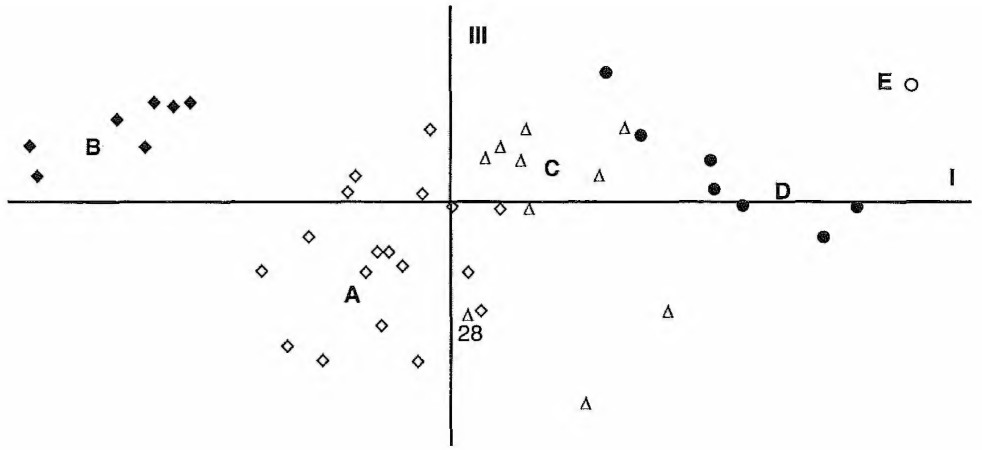

Fig. 5. Ordination (KYSP), vector 1 verses vector 3, analysis one, all specimens. Symbols are: *Boronia rosmarinifolia,* Group A (◇); *B. forsterii,* Group B (◆); *B. splendida* (pro parte), Group C (△); *B. palasepala,* Group D (●); *B. splendida,* (pro parte) Group E (○). Specimen 28, Group C (numbered).

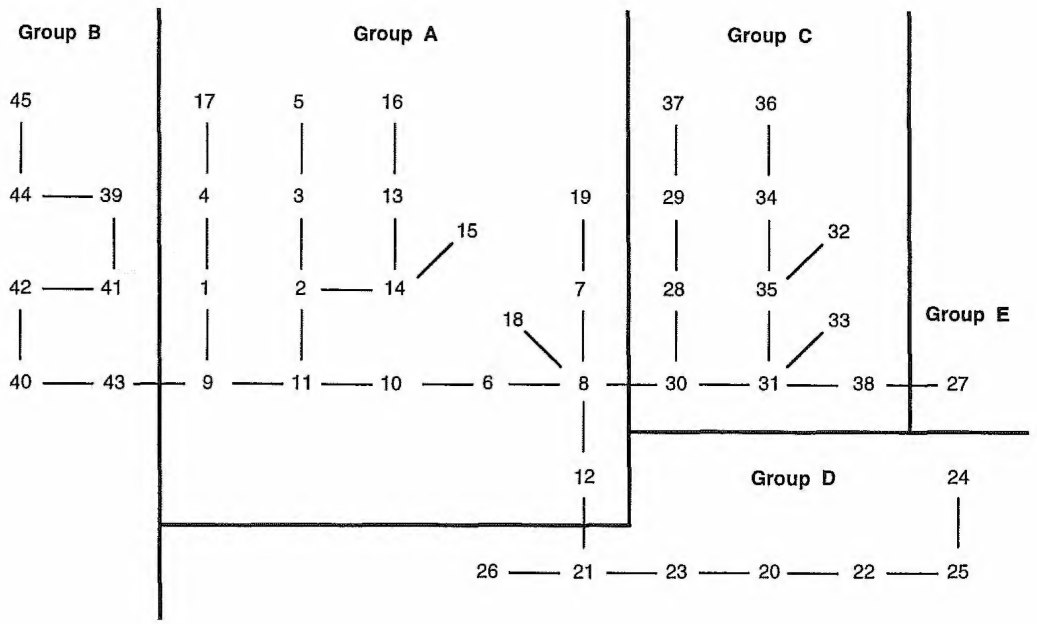

Fig. 6. Minimum spanning tree (MST), analysis one, all specimens.

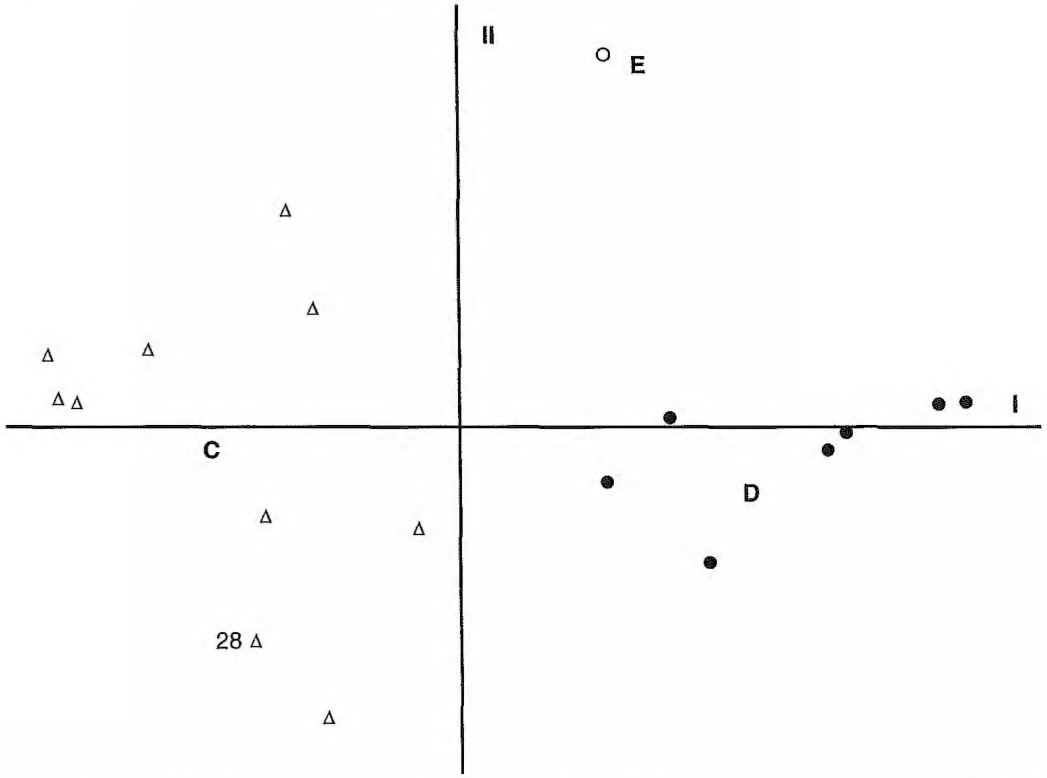

Fig. 7. Ordination (KYSP), vector 1 verses 2, analysis two, specimens 20–38. *Boronia splendida* (pro parte), Group C (△); *B. palasepala,* Group D (●); *B. splendida* (pro parte), Group E (○). Specimen 28 Group C (numbered).

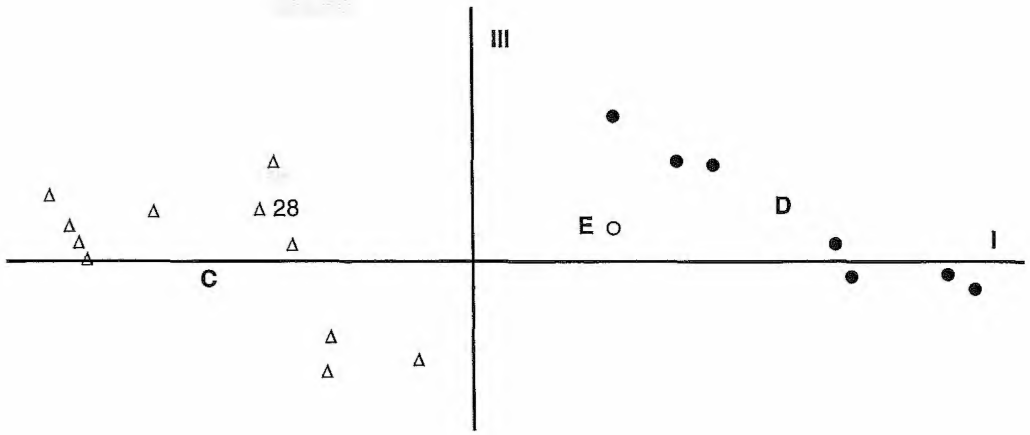

Fig. 8. Ordination (KYSP), vector 1 verses vector 3, analysis two, specimens 20–38. *Boronia splendida* (pro parte), Group C (△); *B. palasepala,* Group D (●); *B. splendida* (pro parte), Group E (○). Specimen 28 Group C (numbered).

Table 3. Character ranges for Groups A, B, C, D and E, with means values given in brackets.

Character	Group A	Group B	Group C	Group D	Group E
1. Style glabrous /hirsute	0	0-1 (0.64)	0	0	1
2. Leaf length (LL) (mm)	12.7-24.6 (18.3)	17.9-35.6 (22.3)	1.6-3.1 (2.5)	24.0-4.7 (3.7)	22.5
3. Leaf width (LW) (mm)	1.7-4.1 (2.3)	1.0-2.1 (1.5)	1.9-3.1 (2.5)	2.7-4.7 (3.7)	2.4
4. LW/LL	0.08-0.20 (0.13)	0.04-0.11 (0.07)	0.10-0.21 (0.17)	0.11-0.16 (0.13)	0.11
5. Sepal length (SL) (mm)	2.0-4.0 (3.0)	3.0-4.5 (3.8)	2.0-3.0 (2.43)	3.5-5.0 (4.4)	6.0
6. Sepal width (SW) (mm)	1.5-2.5 (2.03)	2.0-3.0 (2.36)	1.0-1.5 (1.36)	2.5-4.0 (3.3)	4.0
7. SW/SL	0.50-0.83 (0.68)	0.50-0.75 (0.63)	0.50-0.60 (0.56)	0.63-0.80 (0.75)	0.67
8. Petal length (mm)	5.5-8.0 (6.6)	8.0-11.0 (9.2)	4.0-5.5 (4.9)	8.0-10.0 (8.6)	10.0
9. Petal width (mm)	2.67-4.00 (3.52)	4.5-6.5 (5.4)	1.8-2.5 (2.2)	4.5-6.0 (5.2)	6.0
10. Stellate hair rays on sepals < 0.25 mm long/c. 0.5mm long, 0/1	0	0	0	1	1
11. Anther appendage recurved/erect, 0/1	0	0	1	0	0

Taxonomy

Key to *Boronia* sect. *Valvatae* in Queensland

1. Pinnate leaves present **2**
   All leaves simple **16**

2. Stellate hairs, especially on petals, with fused rays and often appearing peltate; abaxial surface of sepals glabrous (N Qld) **3**
   Stellate hairs with distinct rays; abaxial surface of sepals glabrous or with a sparse to dense indumentum **4**

3. Pinnae linear; branches obviously glandular; petals with a sparse indumentum abaxially ..... **B. bowmanii**[#]
Pinnae elliptic; branches not distinctly glandular; petals with a dense indumentum abaxially, scaly in appearance ..... **13. B. squamipetala**

4. Adaxial and abaxial leaf surfaces with a dense indumentum (no epidermis visible) **5**
Adaxial surface of leaves without a dense indumentum (epidermis clearly visible); abaxial leaf surface glabrous or with a sparse to dense indumentum **8**

5. Sepals much longer and wider than petals ..... **B. lanuginosa**[#]
Sepals much shorter than petals, or as long as but then much narrower than petals **6**

6. Sepals ovate, 1.5 to 2 times as long as wide, with acuminate tip (central Qld) ..... **11. B. duiganiae**
Sepals narrowly deltoid, at least 2.5 times as long as wide, with acute tip (NE & NW Qld) **7**

7. Pinnae linear to narrowly elliptic, c. 1 mm wide; sepals 2–3.5 mm long (NW Qld) ..... **9. B. hoipolloi**
Pinnae elliptic to oblanceolate, (1–)3–7 mm wide; sepals 3–5 mm long (NE Qld) ..... **10. B. quinkanensis**

8. Leaves strongly discolourous with a dense indumentum on the abaxial surface (epidermis not visible) **9**
Leaves slightly discolourous or concolourous, abaxial surface glabrous or with a sparse to moderate indumentum (epidermis clearly visible) **14**

9. Sepals narrowly deltoid, 2.5 times as long as wide, with tip acute **10**
Sepals ovate, 1.5 to 2 times as long as wide, with tip acute or acuminate **12**

10. Leaves trifoliolate (Blackdown Tbld, Central Qld) ..... **B. obovata**[#]
Leaves 5–17-foliolate (N or SE Qld) **11**

11. Leaflets < 5 mm wide; petals 3–7 mm long, the adaxial surface with a dense indumentum; perianth often glabrous abaxially (N Qld) ..... **B. alulata**[#]
Widest leaflets > 5 mm wide; petals (6–)8–12 mm long, the adaxial surface with a sparse indumentum; perianth never glabrous abaxially (SE Qld) ..... **B. amabilis**[#]

12. Leaves sometimes trifoliolate when juvenile but simple when mature, margins flat to slightly recurved; peduncle < 2 mm long; anthopodium 1–5 mm long; petals 5–7 mm long ..... **12. B. odorata**
Leaves imparipinnate, sometimes becoming simple with age, margins flat to revolute; peduncle (1–)2–10 mm long; anthopodium 7–11 mm long; petals (5–)8.5–12 mm long **13**

13. Sepals with tip acuminate, > 3.5 mm long, > 2 mm wide; adaxial surface of leaves with a sparse to dense indumentum ..... **11. B. duiganiae**
Sepals with tip acute, < 3 mm long, < 2 mm wide; adaxial surface of leaves glabrous or with a sparse indumentum ..... **B. ledifolia**[*]

14. Midrib raised on abaxial surface of leaves (Cooloola sand mass, SE Qld) ..... **B. keysii**[#]
Midrib not raised on abaxial surface of leaves (inland Qld) **15**

15. Branchlets not conspicuously glandular; leaves with sparse to moderate indumentum of hairs with flexuous rays, the hairs sometimes stalked (Granite Belt, SE Qld) ..... **B. granitica#**
Branchlets with large hemispherical glands; leaves glabrous or with a sparse indumentum of sessile hairs with straight rays (Central Highlands & Warang of N Qld) ..... **B. eriantha#**

16. Mature leaves only slightly discolourous, glabrous or with a sparse to moderate indumentum on abaxial surface **17**
Mature leaves markedly discolourous with a dense indumentum (epidermis not visible) on abaxial surface (juvenile leaves not so) **19**

17. Leaves petiolate ..... **B. keysii#**
Leaves sessile **18**

18. Leaf margin glandular punctate; leaves with a sparse to moderate indumentum of stalked hairs with flexuous rays ..... **B. repanda#**
Leaf margin smooth, leaves glabrous or glabrescent; hairs sessile, rays straight ..... **B. glabra#**

19. Leaves sessile, base not strongly attenuate **20**
Leaves petiolate or leaf base strongly attenuate **24**

20. Petals (6–)8–13 mm long; sepals 2.5–6 mm long, (2–)3–4 mm wide **21**
Petals 4–7.5 mm long; sepals 2–4 mm long, 1–2 mm wide **22**

21. Leaves strictly revolute, 1–2(–4 mm) wide; anther apiculum large and reflexed; stellate hairs with rays to 0.25 mm long ..... **2. B. splendida**
Leaves flat to recurved, sometimes revolute on drying, 2–6 mm wide; anther apiculum absent or minute; stellate hairs with rays to 0.5 mm long .... **3. B. palasepala**

22. Abaxial surface of petals glabrous or glabrescent; largest leaves greater than 35 mm long ..... **6. B. excelsa**
Abaxial surface of petals with a sparse to moderate simple indumentum; largest leaves usually less than 35 mm long **23**

23. Fruit glabrous or with a sparse indumentum, very rarely densely hirsute; anther apiculum reflexed; stems terete to slightly quadrangular; sepals 2–4.5 mm long; petals 5–7.5 mm long (coastal and near coastal SE Qld and NSW) ..... **1. B. rosmarinifolia**
Fruit densely hirsute; anther apiculum erect; stems quadrangular; sepals 2–2.5 mm long; petals 4–6 mm long (central and inland Qld) ..... **4. B. forsteri**

24. Stamen filaments glabrous or with 1 to 3 simple hairs; petals < 5.5 mm long (NW Qld, NT) ..... **B. lanceolata #**
Stamen filaments densely hirsute; petals (4.5–)5.5–12 mm long (NE & SE Qld) **25**

25. Leaf adaxial surface with a sparse to moderate indumentum **26**
Leaf adaxial surface glabrous or with few hairs along midrib **27**

26. Leaves elliptic, (2–)4–8 mm wide; peduncle 1–2 mm long; anthopodium 1–5 mm long (central inland Qld) ..... **12. B. odorata**

Leaves narrowly elliptic, 1.5–5 mm wide; peduncle 3–5 mm long; anthopodium 4–8 mm long (central coastal Qld?, NSW, Vic.) ..... **B. ledifolia***

27. Adaxial surface of petals with sparse to moderate indumentum of simple hairs (Hinchinbrook Is. of N Qld) ..... **5. B. jensziae**
Adaxial surface of petals glabrous or with very few simple hairs (Mt Windsor Tblds of N Qld or SE Qld) **28**

28. Leaves narrowly elliptic, < 6 mm wide (Mt Windsor Tblds of N Qld) ..... **6. B. excelsa**
Leaves elliptic, to 14 mm wide (SE Qld) **29**

29. Sepals 2–3.5 mm long (before fruit development); petals 6–8 mm long; peduncles 2–3 mm long (Mt Walsh). ..... **7. B. foetida**
Sepals 4.5–5 mm long (before fruit development); petals 9–10 mm long; peduncles to 0.5 mm long (Many Peaks Ra.) ..... **8. B. bella**

Currently accepted Queensland species that are not dealt with further here but discussed in detail in Duretto (1997, and/or submitted). *Boronia lanuginosa* Endl. has recently been collected from NW Qld (P.I. Forster pers. comm.)

* Species not found in Queensland but included in key as it is found very close to Queensland-New South Wales border (see Duretto submitted).

Boronia sect. **Valvatae** (Benth.) Engl., Nat. Pflanzen. 3(4), 135 (1896); *Boronia* ser. *Valvatae* Benth., Fl. Austral. 1: 308, 311 (1863). **Type:** type not cited (see below).

Boronia sect. *Valvatae* has recently been revised (Duretto submitted) and is lectotypified therein. To avoid confusion and duplication in the species descriptions below a short description of this section is given here.

Inflorescence cymose, axillary. Sepals valvate, persistent with mature fruit. Petals valvate, with tip not inflexed, persistent with mature fruit. Stamens 8, all fertile; anthers glabrous. Stigma rounded, not or scarcely wider than style. Seed elliptical in outline with adaxial surface flattened.

1. Boronia rosmarinifolia A. Cunn. ex Endl., Enum. Plant., Hügel: 16 (1837). **Type:** Queensland. MORETON DISTRICT: Peel's Island, Moreton Bay, in 1824, *A. Cunningham* (holo: W?, *n.v.*)

Boronia ledifolia var. *rosmarinifolia* (A. Cunn. ex Endl.) Benth., Fl. Austral. 1: 314 (1863).

Illustrations: B.A. Lebler, Qld Ag. J. 98: 196 (1972); K.A.W. Williams, Native Pl. Qld 1: 37 (1979); L. Cronin, Concise Aust. Fl. 80 (1989); P.H. Weston & M. Porteners, Fl. NSW 2: 232 (1991); Fig. 9A–F.

Erect or weakly ascending, much branched shrub to 1 m tall. Multiangular stellate hairs sessile, with 5–10 rays; rays unicellular, free, firm, straight, (0.05–)0.1 mm long, glossy, smooth, white to yellow. Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, with a moderate to dense stellate indumentum, becoming glabrous with age, will regrow from a rootstock; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, sessile, elliptic to obovate, 6–30 mm long, 1–4.5 mm wide, with tip obtuse, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire, recurved or flat; midrib raised slightly to prominent abaxially, with tightly packed parenchyma without secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer (sometimes lacking from midrib) of peltate stellate hairs;

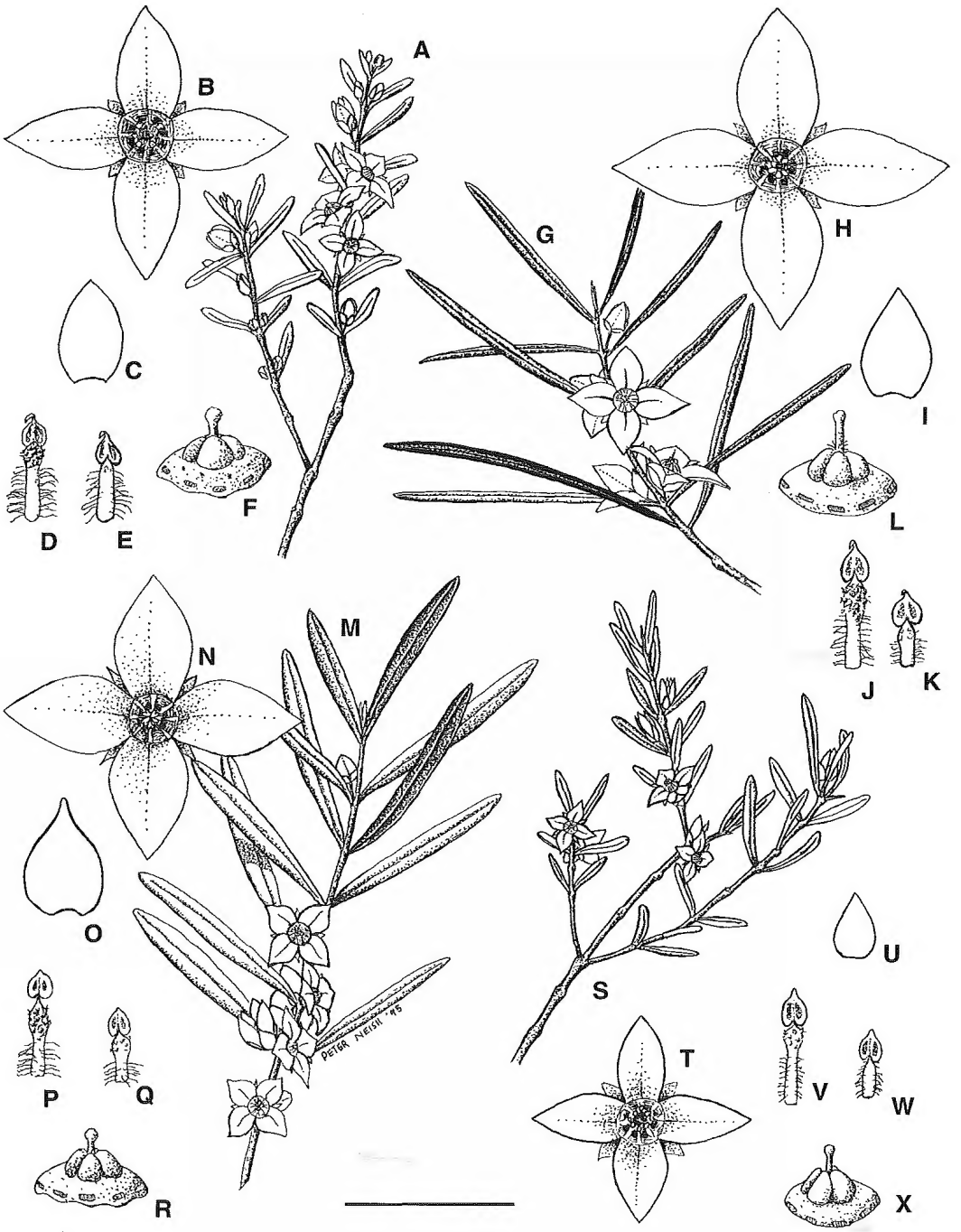

Fig. 9. A–F, *Boronia rosmarinifolia*. A, flowering branchlet; B, flower; C, sepal; D, abaxial view of antesepalous stamen; E, abaxial view of antepetalous stamen; F, disc and gynoecium. A–F, *Duretto* 257 (MEL). **G–L, *B. splendida*.** G, flowering branchlet; H, flower; I, sepal; J, abaxial view of antesepalous stamen; K, abaxial view of antepetalous stamen; L, disc and gynoecium. G–L, *Duretto* 337 (MEL). **M–R, *B. palasepala*.** M, flowering branchlet; N, flower; O, sepal; P, abaxial view of antesepalous stamen; Q, abaxial view of antepetalous stamen; R, disc and gynoecium. M–R, *Duretto* 279 et al. (MEL). **S–X, *B. forsteri*.** S, flowering branchlet; T, flower; U, sepal; V, abaxial view of antesepalous stamen; W, abaxial view of antepetalous stamen; X, disc and gynoecium. S–X, *Forster* 11235 (MEL). Scale bar: A, G, M, S = 24 mm; B, H, N, T = 10 mm; C, I, O, U = 6 mm; D–F, J–L, P–R, V–X = 4 mm. Del. Peter Neish.

juvenile leaves to 48 mm long and 10 mm wide, glabrous but becoming progressively more hirsute along shoot. Inflorescence 1(–3)-flowered, with a moderate to dense stellate indumentum; peduncle to 0.5 mm long, deciduous with flower; prophylls unifoliolate, 1.5–2 mm long, to 0.5 mm wide; metaxyphylls to 0.5 mm long; anthopodium 1–6 mm long. Sepals (Fig. 9C) ovate-deltoid, 2–4 mm long, 1.5–2.5 mm wide, enlarging slightly with mature fruit, with tip acute; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, 5–7.5 mm long, 3–4 mm wide, enlarging to 8–10 mm long and 6 mm wide with mature fruit, with midvein raised abaxially; adaxial surface sparsely to moderately simple pubescent; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 2 mm long, the distal 0.5–1 mm prominently glandular (Fig. 9D); antepetalous filaments c. 1.5 mm long, the distal end glandular (Fig. 9E). Anthers monomorphic or antepetalous anthers slightly larger before dehiscence; anther appendage large, reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 9F). Gynoecium glabrous (Fig. 9F). Coccus 4–5.5 mm long, 2.5–3.5 mm wide, glabrous or very rarely densely hirsute. Seeds black, shiny, 4–4.5 mm long, 2–2.5 mm wide, adaxial side without a ridge; elaiosome (placental portion of endocarp) yellow-white; surface at magnification as with *B. odorata*, Fig. 10A,B). *Rosemary Boronia*, *Forest Boronia* or *Possum Boronia*.

***Additional selected specimens* (c. 50 collections examined): Queensland.** Burnett District: Curtis Rd, Kingaroy, 26°31'S 151°52'E, Sep 1996, *Bean* 10650 (MEL); Wide Bay District: W side of highway, Sunshine Beach, 2 miles S of Noosa, 26°26'S 153°04'E, Oct 1968, *Baxter & Lebler* 1132 (CANB, MEL, NSW); Rainbow Beach Rd towards Rainbow Beach, c. 300 m inside Cooloola NP opposite sandstone hill, 26°01'S 153°00'E, Sep 1992, *Duretto* 258–60, *Bayly & Marsh* (258 - BRI, MEL, NSW; 259, 260 - MEL); Wide Bay, E side of Cooloola Coast Rd, 49 km S of Maryborough, 25°56'S 152°51'E, Sep 1989, *Jobson* 930 & *Lum* (MEL); Cooloola NP between Camp Milo & Freshwater Ck, 26°0–'S 153°0–'E, Jun 1970, *McDonald* 476 (BRI, CANB); Elliot R., near Bundaberg, May 1967, *Olsen* 330 (NSW); Fraser Is., Lake Boemingen, 1 km S of lake along Dili Village walking tract, Oct 1982, *Parish* s.n. (MEL); 2.8 km S of Rainbow Beach, Cooloola NP, 25°58'S 153°09'E, Sep 1986, *Ross* 3196 (AD, MEL); Fraser Is., between Lake Birrabeen & Lake Boemingen, 25°32'S 153°04'E, Aug 1971, *Smith* 7 (MEL); Fraser Is., southern half, 1.5 km W of Lake Boemingen camping area, 25°33'S 153°04'E, Aug 1984, *Walsh* 1399 (MEL); Moreton District: Collingwood Park near Ipswich, 27°37'S 152°52'E, Jul 1990, *Bird* s.n. (BRI, CANB, MEL); Mt Tamborine, May 1930, *Cheel* s.n. (NSW); 4 km S of Sunshine Beach turnoff along coast Rd S of Noosa Heads, 100m along track heading W opposite car park, 26°28'S 153°06'E, Sep 1992, *Duretto* 253–7, *Bayly & Marsh* (253, 255 - MEL; 254, 257 - BRI, MEL; 256 - BRI, MEL, NSW); Miami, south coast, Sep 1965, *Jones* 3060 (CANB); North Stradbroke Is., c. 27°28'S 153°30'E, Aug 1970, *Moriarty* 415 (CANB); Moreton Is., Aug 1855, *Mueller* s.n. (MEL, TCD); Near Dunwich, North Stradbroke, Sep 1941, *Perry* s.n. (BRI); Sunnybank, 8 miles E of Brisbane, Aug 1930, *White & McKie* s.n. (NSW); Karawatha bushland, 1–1.5 km WNW of Trinder Park Railway Station, Woodridge, Jul 1982, *Willis* s.n. (MEL); **New South Wales.** North Coast: Fortis Ck, 24 km N of Grafton on the road to Coaldale, Aug 1985, *Foreman* 907 (CANB, MEL); Property of Mr A. Ford at Whiteman Ck near Copmanhurst, Jul 1979, *Grieves* s.n. (NSW).

***Typification*:** The type of *B. rosmarinifolia* has not been seen by the author but it should be in W where Endlicher worked. There is no confusion regarding application of this name however as *B. rosmarinifolia* is the only member of *Boronia* sect. *Valvatae* occurring in the Moreton Bay area of Queensland. The only other member of this section found close to the Moreton Bay area is *B. keysii* Domin (Cooloola sand mass) which has pinnate or rarely simple, broad, flat, petiolate leaves with a sparse indumentum.

***Taxonomy*:** Bentham (1863) reduced *B. rosmarinifolia* to varietal rank under *B. ledifolia* which was followed by Bailey (1899) in his *Queensland Flora* and later in his various catalogues of Queensland plants (e.g. Bailey 1913). Cheel (1928) reinstated *B. rosmarinifolia* to specific rank, which is the status accepted in this paper. Cheel (1928) also described *B. rosmarinifolia* var. *albiflora* Cheel. This variety was based on material of *B. ledifolia* s. str. and so is not discussed further here (see Duretto submitted).

***Notes*:** Normally this species has glabrous fruit but two collections (*Baxter & Lebler* 1132 [BRI, NSW]; *Perry* s.n., Sep 1941 [BRI]) have

densely hirsute fruit as with fruits of *B. forsteri* and *B. glabra*. The presence of hirsute fruit in these two specimens of *B. rosmarinifolia* is not considered to be of any significant taxonomic importance. *Boronia rosmarinifolia* is distinguished from *B. forsteri* by its larger flowers and leaves, reflexed anther apiculum and usually glabrous fruits, from *B. splendida* and *B. palasepala* by its smaller flowers and leaves, and from *B. chartacea* P.H.Weston (North Coast, NSW) by its sessile leaves.

***Distribution and ecology*:** Found in coastal and near coastal areas from Bundaberg, Wide Bay District, Queensland, to Grafton, North Coast, New South Wales (Fig. 1). Common in coastal heath (wallum) and woodland communities on well drained sand and sandstone derived soils. Flowering and fruiting material collected from May to December.

***Conservation status*:** Common, widespread and found in several conservation reserves. Under no immediate threat except local extinction in and around Brisbane and the Gold Coast of Queensland.

***Etymology*:** The specific epithet refers to the leaves that are similar to those of species of *Rosmarinus* L. (Lamiaceae).

2. Boronia splendida Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. foliis angustissimis revolutis, et floribus grandioribus (petalis 8–13 non 5–7.5 mm longis) differt. **Typus:** Queensland. MORETON DISTRICT: Falls Ck, 4 km NW of Haldon, Helidon 9342–084285, 27°45'S 152°04'E, 2 October 1988, *P.I. Forster* 4762 & *L.H. Bird* (holo: MEL [MEL 1575271]; iso: AD [AD 99120272], BISH (n.v.), BRI [AQ429500], CANB [CBG 8908090], K (n.v.), MO (n.v.) (Fig. 9G–L).

Erect, much branched shrub to 2.5 m tall. Multiangular stellate hairs sessile, with 5–10 rays; rays unicellular, free, firm, straight, to 0.05(–0.1) mm long, glossy, smooth, white to yellow. Branches slightly quadrangular in TS, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, sessile, linear to narrowly elliptic, 9–50 mm long, 1–2(–4) mm wide, with tip obtuse, base attenuate, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire, strongly revolute;

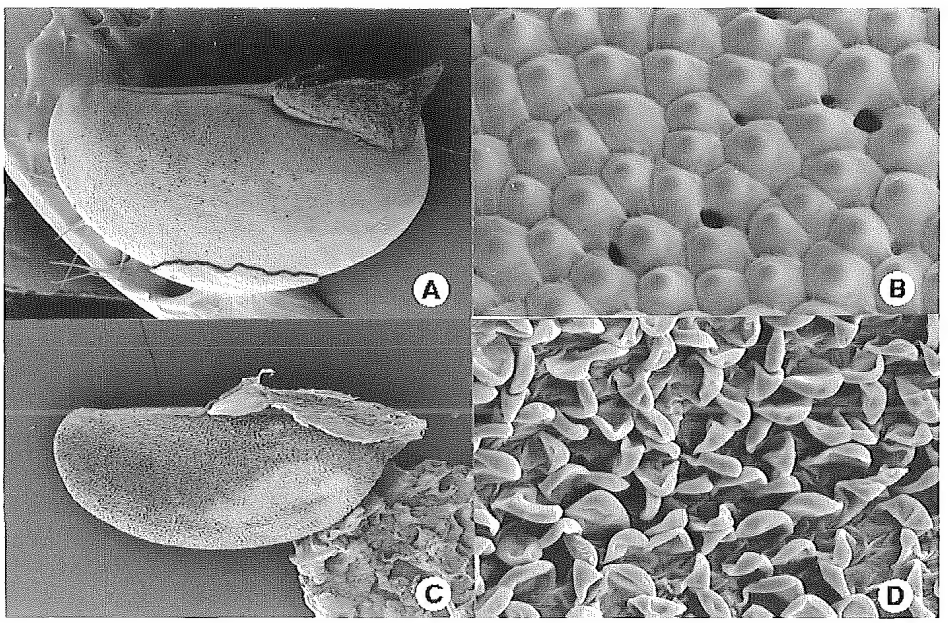

Fig. 10. Scanning electron micrographs of *Boronia* seed surfaces. A–B, *Boronia odorata. Duretto* 285 et al. (MEL); A x 14, B x 250). C–D *B. hoipolloi. Clarkson* 10473 (BRI); C x 19, D x 300.

midrib raised abaxially, with tightly packed parenchyma without secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer (lacking or sparse cover on midrib) of peltate stellate hairs. Inflorescence 1(–3)-flowered, with a dense stellate indumentum; peduncle 0–0.5 mm long, deciduous with flower; prophylls unifoliolate, 0.5–3 mm long, to 0.5 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls to 0.5 mm long; anthopodium 2–6 mm long. Sepals (Fig. 9I) ovate-deltoid, 2.5–4(–6) mm long, 2–4 mm wide, enlarging slightly with mature fruit, with tip acute; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, (6–)8–13 mm long, 4.5–6 mm wide, enlarging to 12–14 mm long and 6–7 mm wide with mature fruit, with midvein raised abaxially; adaxial surface moderately simple pubescent; abaxial surface with a moderate stellate indumentum. Stamen filaments clavate, tapering to anther connective, densely covered with stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments c. 1.5 mm long, the distal c. 0.5 mm prominently glandular (Fig. 9J); antepetalous filaments slightly tuberculate, c. 1 mm long (Fig. 9K). Anthers monomorphic; anther appendage large, reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 9L). Ovary glabrous (Fig. 9L). Style glabrous or hirsute. Coccus 5–6 mm long, 2.5–3 mm wide, glabrous. Seeds black, shiny, c. 4 mm long, c. 2 mm wide, with adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** BURNETT DISTRICT: Stalworth Rd, north of Proston, 26°07'S 151°36'E, Sep 1996, *Bean* 10670 (MEL); Mundubbera, 9146–374346, 1.5 km W of 'Mimosa' Homestead, 25°54'S 151°23'E, Sep 1985, *Forster* 2243 (BRI); 8 km W of 'Manar', Homestead, Boondooma, 9145–303219, 26°01'S 151°18'E, Aug 1988, *Forster* 4647 (BRI, CANB); Beeron Holding, 5 km W of Toondahra Homestead, 25°58'S 151°20'E, Sep 1992, *Forster* 11202 & *Sharpe* (BRI, MEL); Beeron Holding, 25°59'S 151°20'E, Sep 1996, *Forster* 19603 & *Ryan* (MEL); DARLING DOWNS DISTRICT: 4.8 km E of Tara turn off, & 5.3 km E of Kogan on Condamine Hwy, near dog fence, c. 27°02'S 150°46'E, Sep 1992, *Duretto* 337–344, *Bayly & Marsh* (337 - AD, BRI, CANB, MEL, NSW, PERTH; 338 - BRI, CANB, MEL; 339, 342–344 - MEL; 340 - BRI, CANB, MEL, NSW; 341 - BRI, MEL, NSW); Darling Downs, *Lace* s.n. (MEL); c. 2 miles E of Kogan, on the Condamine Hwy, Aug 1961, *Phillips* s.n. (CANB); Condamine Hwy, near dog fence, Sep 1964, *Shoobridge* s.n. (BRI [AQ15118], CANB, DNA); Dalby-Condamine, Sep 1964, *Shoobridge* s.n. (CANB [CBG15711]); 3 miles c. SE of Kogan, 27°02'S 150°46'E, Oct 1940, *Smith & Everist* 817 (MEL); c. 29 miles WNW of Dalby, near grid on the Condamine Hwy, 27°0–'S 150°4–'E, Sep 1968, *Smith* 14102 (BRI, DNA); Condamine, 26°56'S 150°08'E, Jul 1964, *Ward* s.n. (PERTH); On Condamine Hwy near rabbit fence, Oct 1984, *Williams* 84159 (BRI); MORETON DISTRICT: East Egypt, 25 km SW of Gatton, 27°40'S 152°07'E, Oct 1991, *Bird* s.n. (BRI, CANB); East Egypt, 16 km SW of Gatton, 27°40'S 152°07'E, Mar 1992, *Bird & Pahl* s.n. (BRI, CANB).

***Notes*:** The tall inland form of *B. rosmarinifolia* referred to by Lebler (1972) probably is *B. splendida*. *Boronia splendida* is closely related to *B. forsteri*, *B. palasepala* and *B. rosmarinifolia* from which it can be distinguished by its tall stature, comparatively long and narrow leaves with revolute margins, and large flowers. A Proston specimen (*Bean* 10670) has smaller flowers and a smaller anther appendage than other collections but its strictly revolute, narrow leaves and small hairs identifies it as *B. splendida*. Further research and collections, preferably of several plants per population, of *B. spendida* are required in the northern part of its range to ascertain whether or not the specific distinction between *B. splendida* and *B. palasepala*, as described here, is warranted.

***Distribution and ecology*:** Occurs in the Condamine-Kogan area, and north to 'Mimosa' homestead c. 50 km S of Mundubbera (Fig. 1). Found on sandstone derived soils in eucalypt and acacia woodland. Flowering material collected from March to November; fruiting material in November.

***Conservation status*:** Though found over a wide area, collections of *B. splendida* are geographically isolated and populations at each site are small. This species is not known to occur in any reserves and a ROTAP code of 2R is therefore appropriate.

***Etymology*:** The specific epithet is derived from Latin, *splendidus* (splendid, showy, striking), and refers to the spectacular display of comparatively large flowers by this species.

3. Boronia palasepala Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. sepalis majoribus ((3–)4–6 non 2–4 mm longis, 2–4 non 1.5–2.5 mm latis) ad apices acuminatis, petalis longioribus (8–10.5 non 5–7.5 mm longis), et antheris non-apiculatis differt. **Typus:** Queensland. BURNETT DISTRICT: Coominglah State Forest 28, c. 24°51'30"S 150°56'E, Grid Ref. 9048–916493, 6 September 1992, *M.F. Duretto* 277, *M. Bayly & N. Marsh* (holo: MEL [MEL 2036610]; iso: AD, BRI, CANB, HO, K, MEL [MEL 2036611, MEL 2036612], NSW, PERTH) (Fig. 9M–R).

Erect, much branched, rounded shrub to 2 m tall. Multiangular stellate hairs sessile, with 5–10+ rays; rays unicellular, free, firm, straight, to 0.25(–0.5) mm long, glossy, smooth, white to yellow or red. Branches slightly quadrangular in TS, not glandular, with little or no cork development, with a moderate to dense stellate indumentum, becoming glabrous with age, branches will regrow from a rootstock; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, sessile, elliptic to obovate, 14–42 mm long, 2–6 mm wide, with tip obtuse, base attenuate, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire, flat to recurved (revolute on drying); midrib raised abaxially, with tightly packed parenchyma without secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs. Inflorescence 1(–3)-flowered, with a moderate to dense stellate indumentum; peduncle to 0.5 mm long, deciduous with flower; prophylls unifoliolate, 1–3 mm long, 0.5–1 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls minute, to 1.5 mm long; anthopodium 1–3(–5 mm in Biloela specimens) mm long. Sepals (Fig. 9O) broadly ovate-deltoid, (3–)4–6 mm long, (2–)3–4 mm wide, with tip acuminate to acute; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, 8–10.5 mm long, 4.5–6 mm wide, with midvein raised abaxially; adaxial surface moderately simple pubescent; abaxial surface with a moderate stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 2 mm long, the distal 0.5–1 mm prominently glandular (Fig. 9P); antepetalous filaments c. 1.5 mm long, the distal end glandular (Fig. 9Q). Anthers monomorphic; anther appendage absent or minute. Disc entire, not surrounding base of filaments, glabrous (Fig. 9R). Gynoecium glabrous (Fig. 9R). Fruit and seed not seen.

Additional specimens examined: Queensland. BURNETT DISTRICT: Coominglah State Forest 28, c. 24°51.5 S 150°56'E, 9048–916493, Sep 1992, *Duretto* 275, 276, 278, 279, *Bayly & Marsh* (275 - BRI, CANB, MEL, NSW; 276 - BRI, K, MEL, NSW; 278 - AD, BRI, HO, NSW, MEL, PERTH; 279 - BRI, CANB, K, MEL, NSW); *ibid*, 24°51'S 150°57'E, 9048–914493, Jul 1990, *Forster* 6961 (BRI); *ibid*, 24°55'S 150°59'E, 9048–971425, Jul 1990, *Forster* 6906 (BRI, CANB, MEL, NSW); Coominglah SF28, boundary between compartments 18 & 33, 14 km SW of Monto, 9048–KT982410, Aug 1976, *Martensz* 1014 (CANB); 15 km NE of Biloela, 3 km N of Callide dam, Jul 1992, *Thompson* BIL10 (AD, PERTH).

Notes: *Boronia palasepala* can be distinguished from the other members of the *B. rosmarinifolia* species complex by its comparatively large flowers, usually wide leaves with recurved margins (which can become revolute on drying) and spade-shaped sepals.

Distribution and ecology: Occurs near Biloela and in Coominglah State Forest (SF28, near Monto), Queensland (Fig. 1). Found growing on sandstone in eucalypt open forest or woodland where it can dominate the understorey. Flowering material collected from July to September.

Conservation status: *Boronia palasepala* is known from few small populations outside existing conservation reserves; a ROTAP code of 2R is therefore appropriate.

Etymology: The specific epithet is derived from Latin *pala* (spade) and *sepala* (sepal), and alludes to the spade shaped (as of playing cards) sepals (Fig. 9O).

4. Boronia forsteri Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. petalis

et sepalis minoribus (2–2.5 non 2–4 mm longis) et coccis hirsutis differt. **Typus:** Queensland. LEICHHARDT DISTRICT: 7 km past Glenhaugton Homestead on Mapala Rd, SF46, 25°21'S 149°19'E, 10 September 1992, *P.I. Forster* 11235 & *P.R. Sharpe* (holo: MEL [MEL 2049140]; iso: BRI [AQ561403], NSW) (Fig. 9S–X).

Boronia sp. (Robinson Gorge P.I. Forster+ PIF11235) (Forster 1997).

Erect, much branched shrub to 1(–2) m tall. Multiangular stellate hairs sessile, with 5–10 rays; rays unicellular, free, firm, straight, to 0.1 mm long, glossy, smooth, white to yellow. Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, with a moderate to dense stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, sessile, elliptic to obovate, 6–25 mm long, 0.5–5 mm wide, with tip obtuse, base attenuate, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll (fresh material unavailable); margins entire, flat or slightly recurved; midrib raised slightly abaxially, with tightly packed parenchyma without secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs; juvenile leaves to 35 mm long, abaxial surface glabrous or with a sparse indumentum. Inflorescence 1(–3)-flowered, with a moderate to dense stellate indumentum; peduncle to 0.5 mm long, deciduous with flower; prophylls unifoliolate, 1.5–2.5 mm long, to 0.5 mm wide; metaxyphylls to 0.5 mm long; anthopodium 1.5–3 mm long. Sepals (Fig. 9U) ovate-deltoid, 2–2.5 mm long, 1–1.5 mm wide, enlarging slightly to 3 mm long with mature fruit, with tip acute; adaxial surface densely and minutely pubescent near margins, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink, 4–6 mm long, 2–3 mm wide, enlarging to 7–8 mm long and 5 mm wide with mature fruit, with midvein raised abaxially; adaxial surface sparsely simple pubescent; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 1.5 mm long, the distal c. 0.5 mm prominently glandular (Fig. 9V); antepetalous filaments c. 1 mm long, the distal end glandular (Fig. 9W). Anthers monomorphic; anther appendage large, erect, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 9X). Gynoecium glabrous (Fig. 9X). Coccus 5–6 mm long, 2.5–3 mm wide, with a moderate to dense indumentum of erect, simple hairs. Seeds black, shiny, 4.5–5 mm long, 2–2.5 mm wide, with adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** LEICHHARDT DISTRICT: Marlong Arch-Thombs area, 25°05'S 147°52'E, Sep 1978, *Benyon* s.n. (CANB); Gwambagwine, Ruined Castle Ck catchment, 25°13'08"S 149°27'02"E, Sep 1995, *Forster* 17836, *Figg & Carter* (MEL); Gwambagwine, Ruined Castle Ck catchment, 25°12'43"S 149°28'11"E, Sep 1995, *Forster* 17851, *Figg & Carter* (MEL); 5 km past Glenhaugton Homestead on Mapala Rd, SF46, 25°21'S 149°09'E, Apr 1992, *Forster* 9753 & *Manchin* (MEL); Robinson Gorge NP, northern end in headwaters of Glenhaugton Ck in Murphy Range, 25°12'S 149°07'E, Sep 1992, *Forster* 11429 & *Sharpe* (BRI, MEL); Robinson Gorge NP, near Starckvale Ck campsite, 25°18'S 149°11'E, Sep 1992, *Forster* 11244 & *Sharpe* (MEL); Get Down section, Robinson Gorge, Expedition NP, 25°18'08"S 149°11'23"E, Sep 1995, *Forster* 17696 & *Figg* (MEL); Starckvale Creek, Expedition NP, 25°18'34"S 149°10'53"E, Sep 1995, *Forster* 17714 & *Figg* (MEL); 11 km past Glenhaugton Homestead on Mapala Rd, 25°18'S 149°17'E, Sep 1992, *Forster* 11453 & *Sharpe* (BRI, MEL); 11.8 km N of 'Yoothapinna', Injune District, 25°15'S 148°20'E, Sep 1974, *Gittins* 2745 (BRI, NSW); 117.5 km S of Bauhinia Downs on Glenhaughton Rd, 25°17'20"S 149°16'52"E, Oct 1996, *Hill* 4863 (MEL, NSW); 21 miles SE of Bedourie, Oct 1963, *Speck* 1854 (BRI); 500m N of Robinson Gorge, c. 25 km NW of 'Glenhaughton' Homestead, 25°11'S 149°12'E, *Telford* 5635 (CANB); Mt Moffatt section of Carnarvon NP, behind Tombs Bluff, Sep 1986, *Thomas* 138 (CANB); Mt Moffatt 'The Tombs', Sep 1986, *Williams* 86097 (BRI).

***Notes*:** *Boronia forsteri* can be distinguished from *B. rosmarinifolia, B. splendida* and *B. palasepala* by its smaller floral parts, erect anther apiculum and hirsute cocci. The

distributions of *B. forsteri* and *B. glabra* (a simple leaved species) may overlap in the Carnarvon Ranges (Duretto 1995, submitted). These two species both have hirsute cocci and the stamens and sepals of each are similar in size and shape. *Boronia forsteri* can be distinguished from *B. glabra* by having a dense indumentum on the abaxial surface of the leaves, as opposed to the glabrous leaves of *B. glabra* (at least in Queensland).

Distribution and ecology: Occurring on the Chesterton, Carnarvon and Expedition Ranges, and the Central Highlands of Queensland (Fig. 1). Found in dissected sandstone country in eucalypt open woodland or forest. Flowering and fruiting material collected in September and October.

Conservation status: *Boronia forsteri* occurs in Expedition Range and Carnarvon National Parks; a ROTAP conservation code of 2RC- is therefore appropriate.

Etymology: This species is named in honour of Paul Forster (BRI) whose prolific and untiring work, including collection of an impressive number of specimens for world-wide herbaria (often from remote and poorly collected areas), has increased our knowledge of the flora of Queensland and adjacent tropical areas considerably.

5. Boronia jensziae Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. foliis petiolatis, late ellipticis, et sepalis acuminatis, et a *B. bella* Duretto, *B. excelsa* Duretto et *B. foetida* Duretto indumento adaxiali petalorum sparso differt. **Typus:** Queensland. Cook District: c. 300 m S of Banksia Bay turn off along the East Coast Trail between Little Ramsey & Zoe Bays, Hinchinbrook Is., 18°21.73'S 146°18.65'E, 29 May 1993, *M. Duretto* 406 (holo: MEL [MEL 2037448]; iso: AD, BRI, CANB, DNA, K, MEL [MEL 2037449], NSW) (Fig. 11A–F).

Boronia sp. 'Hinchinbrook Is.' (Thomas & McDonald 1989).

Boronia sp.1 (Hinchinbrook Island; S.L. Everist 7786) (Briggs & Leigh 1996).

Boronia sp. (Hinchinbrook Is. S.L. Everist 7786) (Forster 1997).

Illustration: K.A.W. Williams, Native Pl. Qld 2, 58 (1984) (as *Boronia* sp.)

Erect, much branched shrub to 2 m tall. Multiangular stellate hairs sessile, with 8–15 rays; rays unicellular, free, firm, straight, 0.05–0.1(–0.25) mm long, glossy, smooth, white to yellow. Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age, will regrow from a rootstock; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, subsessile to petiolate; petiole 2–4 mm long; lamina elliptic, (10–)15–45 mm long, (4–)6–11.5 mm wide, strongly discolourous, paler beneath, with palisade and spongy mesophyll, with tip acute and ± mucronate, with base strongly attenuate; margins entire, flat to slightly recurved; midrib prominently raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs. Inflorescence 1-flowered, with a dense stellate indumentum; peduncle 0.5–1 mm long, deciduous with flower; prophylls unifoliolate, 2–2.5 mm long, 0.5–1 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls 0.5–1 mm long; anthopodium 2–5 mm long. Sepals (Fig. 11C) broadly ovate-deltoid, c. 4 mm long, c. 2.5 mm wide, not enlarging significantly with mature fruit, with tip acuminate; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, 5.5–7 mm long, 3–3.5 mm wide, enlarging to 7.5–8.5 mm long with mature fruit, with midvein raised abaxially; adaxial surface with a sparse simple indumentum, becoming glabrous towards base; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below

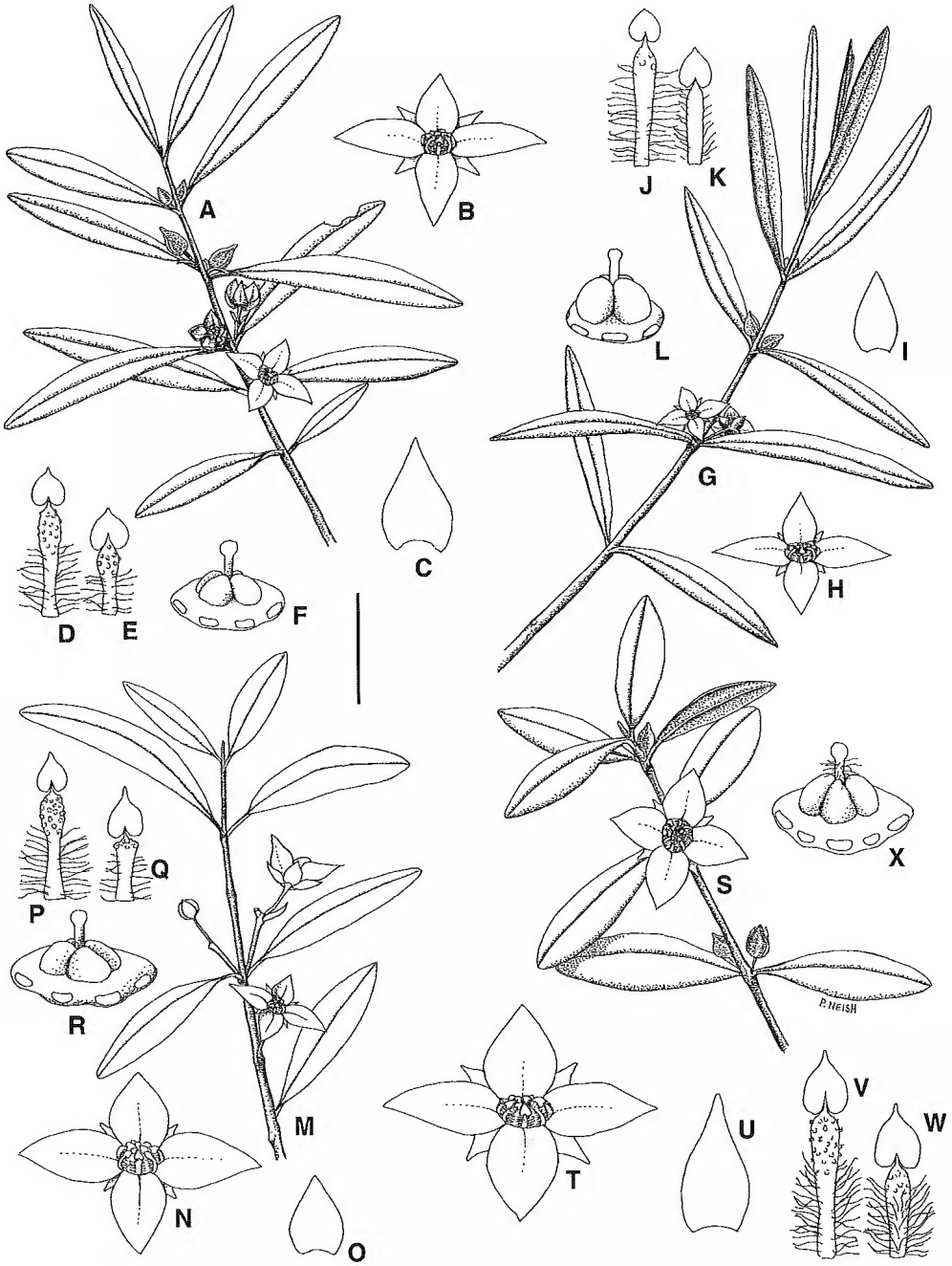

Fig. 11. A–F, *Boronia jensziae*. A, flowering branchlet; B, flower; C, sepal; D, abaxial view of antesepalous stamen; E, abaxial view of antepetalous stamen; F, disc and gynoecium. A–F, *Duretto* 406 (MEL). **G–L, *B. excelsa*.** G, flowering branchlet; H, flower; I, sepal; J, abaxial view of antesepalous stamen; K, abaxial view of antepetalous stamen; L, disc and gynoecium. G–L, *Forster* 17248 (MEL). **M–R, *B. foetida*.** M, flowering branchlet; N, flower; O, sepal; P, abaxial view of antesepalous stamen; Q, abaxial view of antepetalous stamen; R, disc and gynoecium. M, *Forster* 7483 (MEL); N–R, *Duretto* 263 (MEL). **S–X, *B. bella*.** S, flowering branchlet; T, flower; U, sepal; V, abaxial view of antesepalous stamen; W, abaxial view of antepetalous stamen; X, disc and gynoecium; S–X, *Duretto* 269 (MEL). Scale bar: A, G, M, S = 16 mm; B, H, N, T = 8 mm; C, I, O, U = 4 mm; D–F, J–L, P–R, V–X = 2 mm. Figure 11 was prepared by Peter Neish for inclusion in *Flora of Australia* vol. 26 (in prep.) and is reproduced here with the permission of the artist and ABRS.

glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 2 mm long, the distal 0.5–1 mm prominently glandular (Fig. 11D); antepetalous filaments, c. 1.5 mm long, the distal end slightly glandular (Fig. 11E). Anthers monomorphic; anther appendage minute to large and reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 11F). Gynoecium glabrous (Fig. 11F). Coccus 4–4.5 mm long, 2–3.5 mm wide, glabrous. Seeds black, shiny, 2.5–3.5 mm long, 1.5–2 mm wide, with adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B). *Andy Jensz's Boronia, Hinchinbrook Boronia.*

***Additional specimens examined*: Queensland.** North Kennedy District: Zoe Bay, Hinchinbrook Is., Aug 1951, *Blake* 18857 (BRI, CANB); Mt Diamantina, 18°26'S 146°18'E, Jul 1991, *Cumming* 11273 (BRI); Mount Bowen, Hinchinbrook Is., 18°41'S 146°16'E, Jun 1991, *Cumming* 11217 (BRI); c. 300 m S of Banksia Bay turn off along the East Coast Trail between Little Ramsey & Zoe Bays, Hinchinbrook Is., 18°21.73'S 146°18.65'E, May 1993, *Duretto* 405 & 407 (405 - AD, BRI, MEL, PERTH; 407 - BRI, CANB, MEL, NSW); On the East Coast Trail between Banksia & Zoe Bays, Hinchinbrook Is., 18°21.86'S 146°18.74'E, May 1993, *Duretto* 402 & *Vadala* (BRI, CANB, MEL, NSW, PERTH); *ibid*, 18°22.17'S 146°18.86'E, May 1993, *Duretto* 404 & *Vadala* (BRI, MEL); Southern end of Missionary Bay, N end of Hinchinbrook Is., 18°27'S 146°12'E, Feb 1965, *Everist* 7786 (BRI, CANB, MELU, NSW); Hinchinbrook Is., southern end of Missionary Bay, 18°19'S 146°13'E, Jun 1979, *Thornsborne & Thornsborne* 535 (BRI); Zoe Bay, Hinchinbrook Is., Sep 1967, *Thornsborne* s.n. (BRI).

***Notes*:** *Boronia jensziae* is closely related to *B. excelsa*, *B. bella* and *B. foetida* from which it can be distinguished by having a sparse indumentum of simple hairs on the adaxial surface of the petals rather than being glabrous to glabrescent.

***Distribution and ecology*:** Restricted to Hinchinbrook Island, north-eastern Queensland (Fig. 12). A poorly collected species found in a variety of habitats including *Syncarpia* Ten. or eucalypt open forest and montane heath, from sea level to c. 840 m (summit of Mt Bowman). Flowering material collected between February and September; fruiting material in August and September.

***Conservation status*:** Briggs & Leigh (1996) gave a ROTAP code of 2KC- to this taxon but a ROTAP code fo 2RC+ seems more appropriate. Present collections and field observations by the author indicate that though *B. jensziae* does appear to be widespread on the eastern half of Hinchinbrook Island the populations are small and often near hiking trails. Further field research is required to ascertain the range of this species and to study the effect of the tourism on the size of the known populations.

***Etymology*:** This species is named for Andrea Suzan Jensz, for her support and invaluable help to the author throughout the *Boronia* section *Valvatae* project.

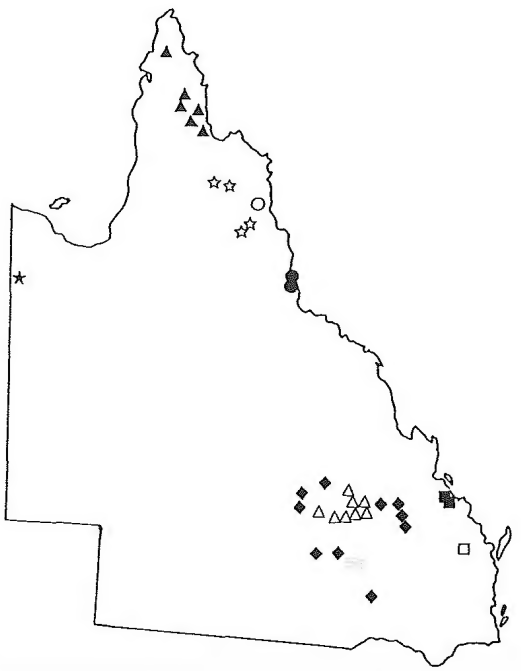

Fig. 12. Distribution of *Boronia bella* (■), *B. duiganiae* (△), *B. excelsa* (○), *B. foetida* (□), *B. jensziae* (●), *B. odorata* (◆), *B. hoipolloi* (★), *B. quinkanensis* (☆) and *B. squamipetala* (▲).

6. Boronia excelsa Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. sepalis acuminatis, et a *B. bella* Duretto, *B. foetida* Duretto et *B. jensziae* Duretto foliis sessilis anguste ellipticis differt. **Typus:** Queensland. Cook District: State Forest 144, Mt Windsor Tableland, 16°15'52"S 145°02'28"E, 11 July 1995, *P.I. Forster* 17248 *& S.J. Figg* (holo: BRI; iso: AD, BRI [×2], CANB, DNA, K, L, MEL [MEL 243038, MEL 249902,

MEL 249903, MEL 2025931], MO, NSW, PERTH, QRS (Fig. 11G–L).

Boronia sp. (Mt Windsor Tableland P.I. Forster+ PIF15225) (Forster 1997).

Erect, much branched shrub to 3 m tall. Multiangular stellate hairs sessile, with 8–20+ rays; rays unicellular, free, firm, straight, 0.05–0.1(–0.25) mm long, glossy, smooth, white to yellow. Branches terete, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves simple, not conspicuously glandular, sessile, narrowly elliptic, 14–60 mm long, 2–6 mm wide, with tip acute, base attenuate, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll (fresh material not seen); margins entire, flat to slightly recurved; midrib prominently raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs. Inflorescence 1-flowered, with a dense stellate indumentum; peduncle c. 0.5 mm long, deciduous with flower; prophylls unifoliolate, 1.5–2.5 mm long, 0.5–1 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls 0.5–1 mm long; anthopodium 2–4 mm long. Sepals (Fig. 11I) broadly ovate-deltoid, 3 mm long, 1.5 mm wide, with tip acuminate to acute; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, 4.5–5 mm long, 2–3 mm wide, with midvein raised abaxially; adaxial surface glabrous or glabrescent; abaxial surface with a moderate stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 1.5 mm long, the distal c. 0.5 mm prominently glandular (Fig. 11J); antepetalous filaments c. 1 mm long, the distal end slightly glandular (Fig. 11K). Anthers monomorphic, apiculum absent. Disc entire, not surrounding base of filaments, glabrous (Fig. 11L). Gynoecium glabrous (Fig. 11L). Coccus c. 4.5 mm long, c. 2 mm wide, glabrous. Seeds black, shiny, 3–3.5 mm long, c. 1.5 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** Cook District: State Forest 144 Mt Windsor Tableland, 16°15'52"S 145°02'28"E, Jul 1995, *Forster* 17253 & *Figg* (BRI, MEL); Spencers Creek, downstream about 2 km from Forestry Camp, Mt Windsor Tableland, Whypalla SF, 16°15'S 145°7'E, Aug 1988, *Hind* 56791 & *D'Aubert* (NSW); SFR144 (Mt Windsor Tableland), 16°15'S 145°00'E, Jun 1969, *Hyland* 4784 (BRI, QRS).

***Notes*:** *Boronia excelsa* is closely related to *B. jensziae*, *B. bella* and *B. foetida* from which it can be distinguished by its narrow, sessile leaves and smaller flowers.

***Distribution and ecology*:** Restricted to the Mount Windsor Tableland, north-eastern Queensland (Fig. 12). Found growing on granite-derived soils in wet sclerophyll and *Syncarpia* forests and along rainforest margins. All collections have been made above 1000 m in altitude.

***Conservation status*:** As the only known collections of *B. excelsa* are from a limited area within a logging reserve (SFR144) a ROTAP conservation code of 2R is appropriate. The type collection was made from a population of c. 40 plants (Forster pers. comm.)

***Etymology*:** The specific epithet is derived from the Latin, *excelsus* (high or elevated), and refers to the comparatively high altitudes where this species occurs.

7. Boronia foetida Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. foliis petiolatis, late ellipticis, et sepalis acuminatis, a *B. bella* Duretto floribus minoribus (sepalis 2–3.5 non 4.5–5.5 mm longis, petalis 7–8 non 7–12 mm longis) et stylis glabris, a *B. jensziae* Duretto petalis adaxialiter glabris et a *B. excelsa* Duretto foliis petiolatis differt. **Typus:** Queensland. Wide Bay District: Mt Walsh, 7 km south of Biggenden, Grid Ref. 9347–046709, 25°34'S 152°03'E, 28 September 1990, *P.I. Forster* 7483 (holo: MEL [MEL 1597019]; iso: AD [AD 99135181], BRI [AQ474340], CANB [CANB 406384], K (n.v.), NSW, PERTH (n.v.) (Fig. 11M–R).

Boronia sp. (Mt Walsh P.I. Forster+ PIF17253) (Forster 1997).

Erect, much branched shrub to 2 m tall. Multiangular stellate hairs sessile, with 8–20+ rays; rays unicellular, free, firm, straight, 0.05–0.1(–0.25) mm long, glossy, smooth, white to yellow (Fig. 13A). Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age, will regrow from a rootstock; decurrent leaf bases absent. Leaves simple, subsessile to petiolate; petiole 2–7 mm long; lamina not conspicuously glandular, elliptic to slightly lanceolate, 20–52 mm long, 7–14 mm wide, strongly discolourous, paler beneath, with palisade and spongy mesophyll, with tip acute, with base attenuate; margins entire, flat to slightly recurved; midrib prominently raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs (Fig. 13A). Inflorescence 1(–3)-flowered, with a dense stellate indumentum; peduncle 2–2.5 mm long, deciduous with flower or rarely persistent;

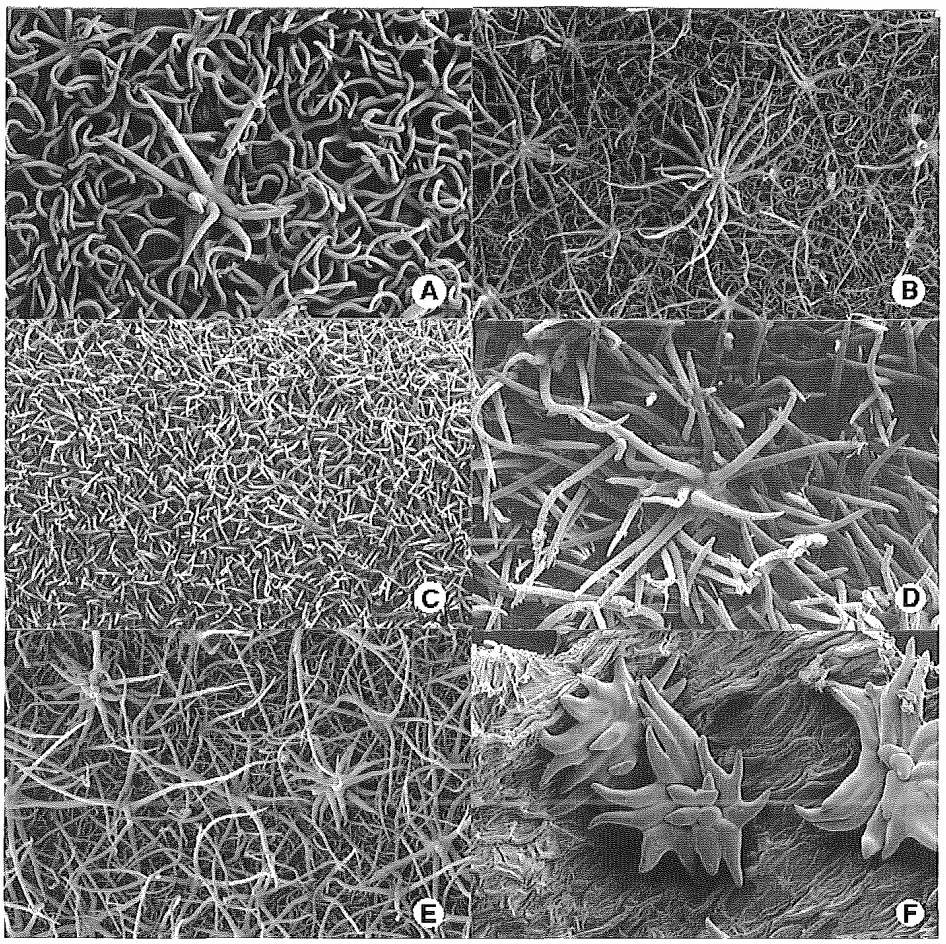

Fig. 13. Multiangular stellate hairs of *Boronia* species; abaxial leaf surface (A, B, D, E), adaxial leaf surface (C), or abaxial petal surface (F). A, *Boronia foetida* , × 180. *Bean* 28 (BRI). B, *B. bella*, × 55. *Duretto* 269 et al. (MEL). C–D, *B. quinkanensis*, C × 55, D × 170. *Clarkson* 6914 (MEL). E, *B. duiganiae*, × 55. *Duretto* 315 et al. (MEL). F, *B. squamipetala*, × 200. *Moreton* 631 (BRI).

prophylls unifoliolate, 1–6 mm long, 0.5–2 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls 0.5–1 mm long; anthopodium 7–13 mm long. Sepals (Fig. 11O) broadly ovate-deltoid, 2–3.5 mm long, 1.5–2.5 mm wide, enlarging to 4 mm long and 3 mm wide with mature fruit, with tip acuminate; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, c. 7 mm long, c. 4 mm wide, enlarging to 8 mm long with mature fruit, with midvein raised abaxially; adaxial surface glabrous or glabrescent; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 2 mm long, the distal 0.5–1 mm prominently glandular (Fig. 11P); antepetalous filaments c. 1.5 mm long, the distal end slightly glandular (Fig. 11Q). Anthers monomorphic; anther appendage large, reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 11R). Gynoecium glabrous (Fig. 11R). Coccus 4–5 mm long, 2–3.5 mm wide, glabrous. Seeds black, shiny, c. 4 mm long, c. 2 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** Wide Bay District: Mt Walsh near Biggenden, 25°3–'S 151°5–'E, Jun 1983, *Bean* 28 (BRI); Gully just below saddle between Mt Walsh & The Bluff, Mt Walsh NP, 25°34'S 152°03'E, Sep 1992, *Duretto* 261–265, *Bayly & Marsh* (261-MEL; 262-MEL, NSW; 263-BRI, MEL; 264-HO, MEL; 265-CANB, MEL); Mt Walsh NP, c. 15 km SW of Biggenden, Sep 1973, *Randell* s.n. (BRI); 13 km S of Biggenden, 25°3–'S 152°0–'E, Jun 1979, *Rayner* s.n. (BRI); Mt Walsh, c. 6.5 km S of Biggenden, 25°34'S 152°02'E, May 1977, *Telford* 5316 (BRI, CANB).

***Notes*:** *Boronia foetida* was referred to as the Mt Walsh form of *B. rosmarinifolia* by Stanley and Ross (1983). Leaves of *B. foetida* show some variation in size. Specimens collected in montane heath communities have smaller leaves than those of specimens collected in the forest communities in gullies at lower altitudes. This phenomenon is common in *Boronia* species and is considered not to be of any taxonomic significance. *Boronia foetida* is closely related to *B. bella* from which it can be distinguished by its smaller flowers, smaller hairs (Fig. 13A,B), and glabrous styles. It can be distinguished from *B. jensziae* by its petals being glabrous adaxially and from *B. excelsa* by its much wider leaves.

***Distribution and ecology*:** Restricted to Mount Walsh, south of Biggenden (Fig. 12). Found in a variety of habitats ranging from montane heath to densely forested gullies. Flowering and fruiting material collected from May to September.

***Conservation status*:** A ROTAP conservation code of 2RC+ is appropriate as the species is confined to Mt Walsh National Park.

***Etymology*:** The specific epiphet is derived from Latin *foetidus* (stinking), and alludes to the foul smelling foliage of this species (much more so than that of other members of *Boronia* sect. *Valvatae*). Some collectors have noted the smell as 'reminiscent of dead possum', but to me the leaves smell like an unpleasant combination of burnt styrofoam, tar and a very mature cheese.

8. Boronia bella Duretto, **sp. nov.** a *Boronia rosmarinifolia* A.Cunn. ex Endl. foliis petiolatis, ellipticus late, et sepalis acuminatis, et a *B. jensziae* Duretto, *B. excelsa* Duretto et *B. foetida* Duretto floribus grandioribus (sepalis 4.5–5.5 mm longis, petalis 7–12 mm longis) et stylis hirsutis differt. **Typus:** Queensland. Port Curtis District: Upper Oaky Ck, Many Peaks Range, c. 24°11.5'S 151°17.5'E, 9149–263238, 5 Sep 1992, *M.F. Duretto* 269, *M. Bayly & N. Marsh* (holo: MEL [MEL 2036441]; iso: AD, BRI, CANB [CBG 9604106], DNA, K, MEL [MEL 2036442], NSW, PERTH). (Fig. 11S–X).

Boronia sp. Telford CBG7702560 (Batianoff & Dillewaard 1988).

Boronia sp. (Many Peaks Range I.R. Telford CBG7702560) (Forster 1997).

Erect, much branched shrub to 2 m tall. Multiangular stellate hairs sessile, with 10–20+ rays; rays unicellular, free, firm, straight, 0.1–0.25(–0.5) mm long, glossy, smooth, white to yellow (Fig. 13B). Branches terete to slightly

quadrangular in TS, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age, will regrow from a rootstock; decurrent leaf bases absent. Leaves simple, subsessile to petiolate; petiole 2–4 mm long; lamina not conspicuously glandular, elliptic, 18–35 mm long, 3.5–10 mm wide, strongly discolourous, paler beneath, with palisade and spongy mesophyll, with tip acute, with base attenuate; margins entire, flat to slightly recurved; midrib prominently raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface glabrous or with few hairs along midrib; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs (Fig. 13B). Inflorescence 1(–3)-flowered, with a dense stellate indumentum; peduncle 0.5–2 mm long, deciduous with flower or rarely persistent; prophylls unifoliolate, 2–5.5 mm long, 0.5–2.5 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls 0.5–2.5 mm long; anthopodium 2–7 mm long. Sepals (Fig. 11U) broadly ovate-deltoid, 4.5–5.5 mm long, 2–2.5 mm wide, not enlarging significantly with mature fruit, with tip acuminate; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, 7–8 mm long, 4–5.5 mm wide, enlarging to 12 mm long with mature fruit, with midvein raised abaxially; adaxial surface glabrous or glabrescent; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 2.5 mm long, the distal 0.5–1 mm prominently glandular (Fig. 11V); antepetalous filaments c. 2 mm long, the distal end slightly glandular (Fig. 11W). Anthers monomorphic; anther appendage large, erect or reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous (Fig. 11X). Ovary glabrous (Fig. 11X). Style hirsute. Coccus 4.5–6 mm long, 2.5–3.5 mm wide, glabrous or with few hairs along suture. Seeds black, shiny, 4–5 mm long, 2–2.5 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** Port Curtis District: Upper Oaky Ck, Many Peaks Range, c. 24°11.5'S 151°17.5'E, Calliope 9149–263238, Sep 1992, *Duretto* 270–273, *Bayly & Marsh* (270 - BRI, CANB, MEL; 271 - BRI, CANB, DNA, K, MEL, NSW; 272 - BRI, MEL, NSW; 273 - BRI, CANB, HO, MEL, NSW, PERTH); Mt Castletower NP, eastern slopes of Many Peaks Range, 24°07'41"S 151°18'25"E, Feb 1995, *Forster* 16338 (MEL); SF521, Many Peaks Range, 24°12'42"S 151°20'31"E, Feb 1995, *Forster* 16255 (MEL); Many Peaks Range, *Olsen* 348 (NSW); Many Peaks Range, Mt Castletower, 24°10'S 151°17'E, *Telford* 5479 (BRI, CANB).

***Notes*:** *Boronia bella* is closely related to *B. foetida* from which it can be distinguished by its larger flowers, larger hairs (Fig. 13A,B), and hirsute styles. Both these species can be distinguished from *B. jensziae* by having petals that are glabrous adaxially and from *B. excelsa* by having much wider leaves.

***Distribution and ecology*:** Known only from the Many Peaks Range near Gladstone (Fig. 12). Found in eucalypt forest and woodland on granite-derived soils. Flowering material collected from May to September; fruiting material in September.

***Conservation status*:** Batianoff & Dillewaard (1988) considered this species to be rare. Collections have been made within the Mount Castletower National Park so the species does not appear to be threatened. A ROTAP conservation code of 2RC– is therefore appropriate.

***Etymology*:** The specific epithet is derived from Latin *bellus* (beautiful), and refers to the spectacular displays made by the species large, deep-pink flowers.

9. Boronia hoipolloi Duretto, **sp. nov.** a *Boronia alulata* Sol. ex Benth. paginis ubique dense hirsutis, et a *B. quinkanensis* Duretto foliolis angustioribus differt. **Typus:** Queensland. Burke District: Amphitheatre, a sandstone escarpment c. 27 km north of Musslebrook mining Camp, 18°21'S 138°09'S, 12 June 1995, *J.R. Clarkson* 10473 (holo: BRI; iso: MEL [MEL 2032037, MEL 2032038]) (Fig. 14A–E).

Pendulous or erect, much branched shrub to 50 cm long, with a dense stellate indumentum throughout. Multiangular stellate hairs sessile, with 4–12 rays; rays unicellular, free, firm, straight, to 0.2 mm long, glossy, smooth, white. Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, becoming glabrous with age; decurrent leaf bases absent. Leaves imparipinnate, with 7–25 pinnae, gradually increasing in number of pinnae along axillary branches, not conspicuously glandular, entire leaf 15–35 mm long, 5–13 mm wide; petiole winged, 2–5 mm long; rhachis segments winged, oval, 1.5–6 mm long, c. 0.5 mm wide; pinnae opposite or sometimes subopposite, narrowly-elliptic to linear, subsessile, with tip obtuse, margins entire and recurved, discolourous, slightly paler beneath, lamina with palisade and spongy mesophyll; midrib raised abaxially, with tightly packed parenchyma between midvein and abaxial epidermis with secondary thickening in cells in the layer above the epidermis only, impressed adaxially; adaxial surface with a dense stellate indumentum; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs; terminal pinnae longer than the most distal lateral pinnae but shorter than others, 1–8 mm long, 0.5–1 mm wide; lateral pinnae 1–7 mm long, 0.5–1 mm wide. Inflorescence 1–5-flowered; peduncle to 2 mm long, not deciduous with flower; prophylls unifoliolate or pinnate, to 2.5 mm long; metaxyphylls minute; anthopodium 1–4 mm long. Sepals (Fig. 14C) narrowly deltoid, 2–3.5 mm long, 0.75–1.25 mm wide, not enlarging significantly with fruit, with tip acute to slightly acuminate; adaxial surface densely and minutely pubescent, becoming sparse to glabrous towards base or hirsute at tip only; abaxial surface with a moderate to dense stellate indumentum. Petals pink, 3.5–5 mm long, 1.5–2 mm wide, not enlarging significantly with mature fruit, with midvein raised abaxially; adaxial surface with a moderate simple indumentum, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Stamen filaments capitate, tapering to anther connective, with stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments, c. 2 mm long, the distal c. 0.5 mm prominently glandular (Fig.14D); antepetalous filaments 1–1.5 mm long, the distal end slightly glandular or eglandular (Fig.14E). Anthers more or less monomorphic, appendage absent or minute. Disc entire, not surrounding base of filaments, glabrous. Ovary glabrous. Style hirsute or glabrous. Coccus (fully mature not seen) c. 3.5 mm long, c. 2 mm wide, glabrous or glabrescent. Seeds (mature not seen) grey, dull, 1.5–2 mm long, 1.5–2 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification composed of collapsed tubercle like units, these units free and 10–30 μm across (Fig. 10 C,D)

***Other specimen examined*: Queensland.** BURKE DISTRICT: Amphitheatre, 40 km (by road) north of Musslebrook Mining Camp, 18°21'S 138°10'S, May 1995, *Johnson* 779 & *Thomas* (BRI).

***Notes*:** *Boronia hoipolloi* was referred to as '*Boronia* aff. *alulata* (NW Qld, Clarkson 10473)' by Duretto (1997). It can be distinguished from *B. alulata* by having a dense stellate indumentum on all its parts, from *B. quinkanensis* by its narrower leaf pinnae, and from *B. lanuginosa*, which is also found in NW Queensland, by its sepals being shorter and narrower than the petals, its petals having a distinctly raised midrib abaxially, and its dull seed lacking a conspicuous ridge on its adaxial side.

Seeds of *B. hoipolloi* are dull and the structures on its testa appear to be collapsed tuburcles (Fig. 10C,D), quite unlike those of most other members of *Boronia* sect. *Valvatae* (cf. Fig. 10A,B, Duretto 1995, submitted, Duretto & Ladiges 1997, in press). Interestingly, *B. viridiflora* Duretto of the north-western Arnhem Land plateau, which is also a cliff dwelling species, also has dull seeds with apparently collapsed tubercles on the testa (Duretto & Ladiges 1997).

***Distribution and ecology*:** Known only from two recent collections from The Amphitheatre, north of the Musslebrook Mining Camp in

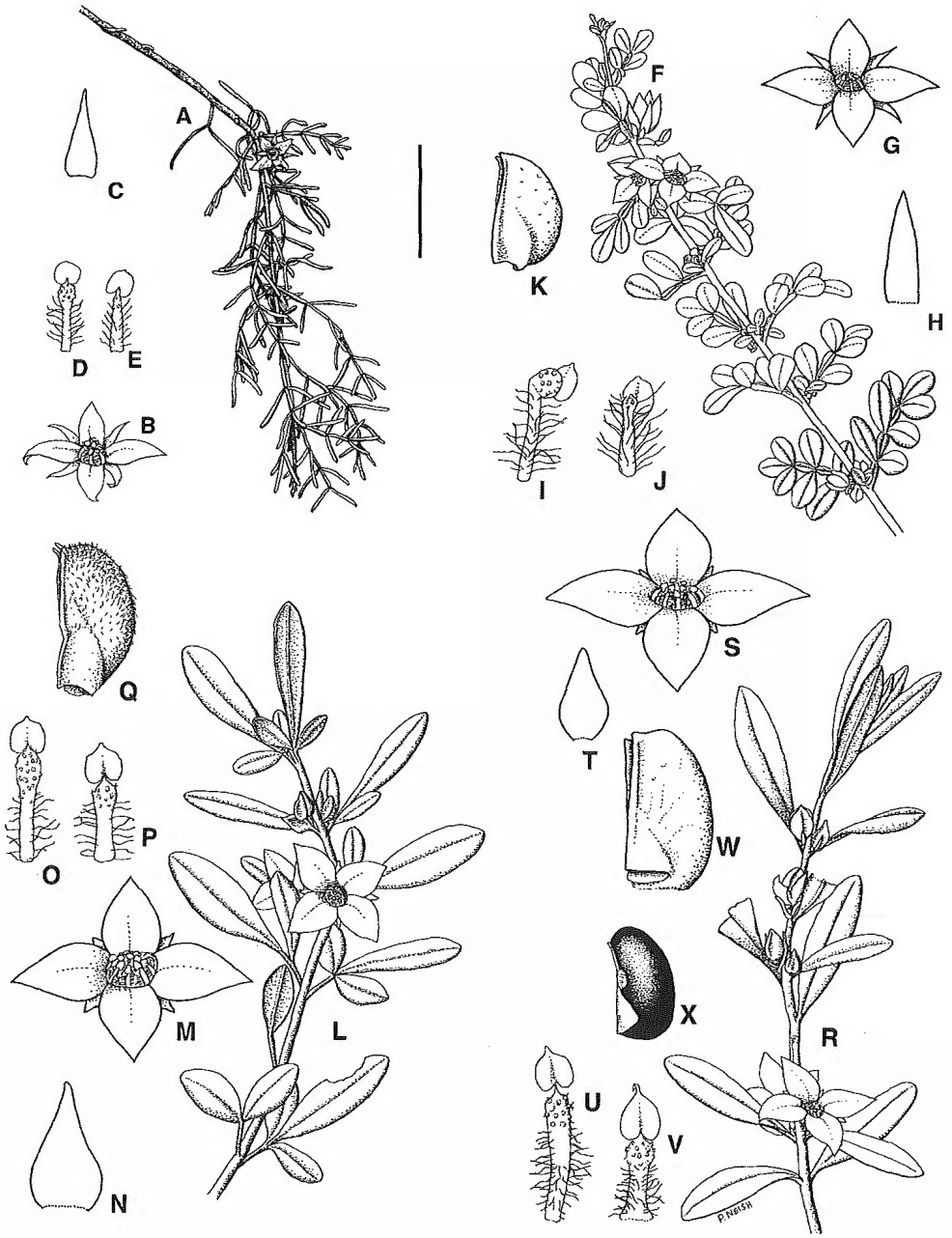

Fig. 14. A–E, *Boronia hoipolloi*. A, flowering branchlet; B, flower; C, sepal; D, abaxial view of antesepalous stamen; E, abaxial view of antepetalous stamen. A–E, *Clarkson* 10473 (BRI). **F–K, *B. quinkanensis*.** F, flowering branchlet; G, flower; H, sepal; I, lateral view of antesepalous stamen; J, abaxial view of antepetalous stamen; K, lateral view of a coccus. F, K, *Clarkson* 3712 (BRI); G–J, *Clarkson* 9619 (MEL). **L–Q, *B. duiganiae*.** L, flowering branchlet; M, flower; N, sepal; O, abaxial view of antesepalous stamen; P, abaxial view of antepetalous stamen; Q, lateral view of a coccus. L, *Thomas* 137 (BRI); M–P, *Duretto* 319 (MEL); Q, *Storey & Yapp* 211 (NSW). **R–X, *B. odorata*.** R, flowering branchlet; S, flower; T, sepal; U, abaxial view of antesepalous stamen; V, abaxial view of antepetalous stamen; W, lateral view of a coccus; X, seed. R, *Bean* 2194 (BRI); S–V, *Duretto* 280 (MEL); W–X, *Everist* 8033 (CANB). Scale bar: A, F, L, R = 16 mm; B, G, M, S = 8 mm; C, H, K, N, Q, T, W, X = 4 mm; D–E, I–J, O-P, U–V = 2 mm. Figures 14F–X were prepared by Peter Neish for inclusion in *Flora of Australia* vol. 26 (in prep.) and are reproduced here with the permission of the artist and ABRS.

north-western Queensland (Fig. 12). Found in crevices in vertical sandstone cliff faces and on scree slopes (collectors' notes). Flowering material collected in May and June; fruiting material in June.

Conservation status: A ROTAP conservation code of 2R is appropriate for this species as the species is apparently common where found (J. R. Clarkson, pers. comm.; collectors' notes). Field research is required to ascertain the size and extent of the known population, and if indeed other populations exist elsewhere.

Etymology: The specific epithet, *hoipolloi*, is derived from Greek for rabble (*hoi polloi* or *oi polloi*), and refers to individuals of the species being found on the outer parts of an amphitheatre, where one expects to find 'the rabble' congregating.

10. Boronia quinkanensis Duretto, **sp. nov.** a *Boronia alulata* Benth. paginis ubique dense hirsutis et sepalis et petalis subaequilibus vel aequalibus, et a *B. hoipolloi* Duretto foliolis latoribus differt. **Typus:** Queensland. Cook District: 22.4 km from Kennedy River on the Jedda Creek Track to King River Station, 15°41'S 143°47'E, 24 June 1981, *J.R. Clarkson* 3712 (holo: BRI [AQ348406]; iso: CANB [CANB 372104, CBG 8505343], DNA, K, MO, NSW [NSW 244358]) (Fig. 14F–K).

Boronia sp. "Jedda Creek" (*J.R. Clarkson* 3712); *Boronia* sp. "Mt Mulligan" (*J.R. Clarkson* 5769) (Thomas & McDonald 1989).

B. sp. (Mt Mulligan, J.R. Clarkson 5301) (Ross 1994; Forster 1997).

Boronia sp.4 (Mt Mulligan; J.R. Clarkson 5301 (Briggs & Leigh 1996).

Erect, much branched shrub to 2.5 m tall, with a dense stellate indumentum throughout. Multiangular stellate hairs sessile, with 7–15+ rays; rays unicellular, free, firm, straight, 0.1–0.5 mm long, glossy, smooth, white (Fig. 13C,D). Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, becoming glabrous with age; decurrent leaf bases absent. Leaves imparipinnate, (1–)3–11 pinnae, gradually increasing in number of pinnae along axillary branches, not becoming unifoliolate with age, not conspicuously glandular, entire leaf 6–25 mm long, 4–15 mm wide; petiole winged, 1–5 mm long; rhachis segments winged, broader at distal end, 1.5–6 mm long, 0.5–2 mm wide; pinnae elliptic to oblanceolate, subsessile, with tip obtuse, discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire, recurved; midrib raised abaxially, with tightly packed parenchyma between midvein and abaxial epidermis with secondary thickening in cells in the layer above the epidermis only, impressed adaxially; adaxial surface with a sparse to moderate stellate indumentum; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs; terminal pinnae longer than the most distal lateral pinnae but shorter than others, (2–)6–15 mm long, (1–)3–7 mm wide; lateral pinnae (2–)5–11 mm long, (1–)3–5 mm wide. Inflorescence 1–3 (–9)-flowered; peduncle 1–23 mm long, not deciduous with flower; prophylls unifoliolate or pinnate, 2.5–5 mm long, 1.5–3 mm wide; metaxyphylls to 0.5 mm long; anthopodium 1–10 mm long. Sepals (Fig. H) narrowly deltoid, 3–5 mm long, 1–1.5 mm wide, not enlarging significantly with fruit, with tip acute to slightly acuminate; adaxial surface densely and minutely pubescent, becoming sparse to glabrous towards base; abaxial surface with a moderate to dense stellate indumentum. Petals pink to white, 4–5.5 mm long, 2–3 mm wide, enlarging to 6–7 mm long with mature fruit, with midvein raised abaxially; adaxial surface with a sparse simple indumentum, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Stamen filaments capitate, tapering to anther connective, with stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments, 1.5–2 mm long, the distal 0.5 mm prominently glandular (Fig. 14I); antepetalous filaments 1–1.5 mm long, the distal end slightly to strongly glandular (Fig. 14J). Anthers more or less monomorphic, apiculum present but minute. Disc entire, not surrounding base of filaments, glabrous. Gynoecium glabrous. Coccus 3.5–4.5 mm long, 2–2.5 mm wide,

glabrous or glabrescent (Fig. 14K). Seeds black, shiny, 3–4 mm long, 1.5–2 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** Cook District: Sandy Ck area N of Jowalbinna, 15°43'S 144°18'E, Jul 1990, *Bean* 1710 (BRI, NSW); Near Laura R., 15°45'S 144°39'E, Aug 1974, *Byrnes* 3079 (BRI, MEL, NSW); 4 km S of the crossing of Shepherd Ck on the Maytown Track, 15°47'S 144°16'E, Jun 1992, *Clarkson* 9619 & *Nelder* (BRI, DNA, K, L, M, MBA, MEL, NSW, PERTH, QRS); 6 km south of Jowalbinna turn off on the Maytown track, 15°48'S 144°16'E, Nov 1983, *Clarkson* 5050 (CANB); Mount Mulligan, c. 30 km NW of Dimbulah, 16°48'S 144°49'E, Jun 1995, *Clarkson* 10541 (BRI, MBA, MEL); Mt Mulligan, c. 40 km NW of Dimbulah, 16°52'S 144°51'E, Apr 1985, *Clarkson* 5769 (BRI, CANB, DNA, MBA, MEL, QRS); *ibid*, Apr 1987, *Clarkson* 6914 (DNA, CANB, MBA, MEL); Mt Mulligan, on the southern plateau of the mountain, 16°54'S 144°51'E, Apr 1984, *Clarkson* 5301 (BRI, CANB, DNA, MBA, NSW, PERTH, QRS); SSW part of Mt Mulligan, c. 16°53'S 144°51'E, May 1993, *Duretto* 380, 385, 388, 389 &*Vadala* (380 - MEL; 385 - BRI, CANB, DNA, K, MEL, NSW, PERTH; 388 - AD, BRI, MEL; 389 - AD, BRI, CANB, DNA, MEL, NSW); Foot of cliffs, Mt Mulligan, 16°52'S 144°52'E, Dec 1936, *Flecker* s.n. (QRS); The Gorge, Mt Mulligan, Apr 1934, *Flecker* s.n. (BRI); 35 km directly SW of Laura, just below escarpment of Pine Tree Ck, 15°47'S 144°12'E, Apr 1987, *Parris* 9198 (BRI, CANB); 35 km SW of Laura, on plateau leading to escarpment above Brady Ck, 15°47'S 144°13'E, May 1987, *Parris* 9200 (BRI, CANB, NSW); c. 42 km directly SSW of Laura, & c. 2 km W of Maytown track just above escarpment of Mossman Ck, 15°55'S 144°18'E, May 1987, *Parris* 9190 (CANB); Jowalbinna camp, c. 30 km SSW of Laura, 15°45'S 144°15'E, Jun 1990, *van der Werff* 11716 (QRS).

***Notes*:** The Flecker specimen from The Gorge, Mt Mulligan, collected in April 1934 (BRI), referred to as *B. artemesiifolia* F.Muell. (= *B. lanuginosa*) by White (1942), is probably the first collection of *B. quinkanensis* held in any herbarium. Both Hnatiuk (1990) and Ross (1994) were probably either referring to White (1942) or to incorrectly determined specimens of *B. quinkanensis* when they stated that *B. lanuginosa* (includes *B. artemesiifolia*) had been collected in the Cook district of Queensland. *Boronia lanuginosa* has only recently been collected from north-western Queensland (P.I. Forster pers. comm.; Duretto submitted).

Boronia quinkanensis is not easily confused with any other species of *Boronia* in north-eastern Queensland as it is the only species with a dense indumentum throughout. It is distinguished from *B. lanuginosa* by its more ovate leaflets, its sepals never being wider and rarely longer than its petals, its petals having a distinctly raised midrib abaxially, and its seed lacking a conspicuous ridge on its adaxial side. From *B. hoipolloi* it is distinguished by its much wider leaflets.

***Distribution and ecology*:** Occurs in the 'Quinkan' sandstone country south of Laura, and also on Mt Mulligan (near Dimbulah) to the south of that (Fig. 12). Found in woodland and heath, on sandstones. These sandstones, Mesozoic in origin, are extensive in the Laura area with an isolated occurrence of the 'pepper pot' type on Mt Mulligan (Keyser & Lucas 1968; Arnold & Fawckner 1980). Surrounding these sandstones are the Hodgkinson formations of greywacke, siltstones, shale, slates etc. (Arnold & Fawckner 1980) on which *B. quinkanensis* is not found. Flowering and fruiting material collected from April to December.

***Conservation status*:** Briggs & Leigh (1996) gave a ROTAP conservation code of 3K to this taxon, but a conservation code of 3R is more appropriate as the species does not appear to be under any immediate threat.

***Etymology*:** The specific epithet is derived from the name of the area where this species is commonly found, the so-called Quinkan country.

11. Boronia duiganiae Duretto, **sp. nov.** a *Boronia lanceolata* F. Muell. et *B. odorata* Duretto foliis pinnatis cum indumento adaxialis moderato ad densum differt. **Typus:** Queensland. Leichhardt District: Consuelo, 16 miles SW of Rolleston Township, 1 September 1961, *Lazarides & Storey* 116 (holo: CANB [CANB 112028]; iso: AD [AD 96244143], BRI [AQ 121206], MEL [MEL 250602], NSW [NSW 238032]).

Erect, much branched shrub to 2 m tall. Multiangular stellate hairs sessile, with 10–25+ rays; rays unicellular, free, firm, straight, c. 0.75(–1) mm long, glossy, smooth, becoming weak, flexuous and dull with age, white to

yellow (Fig. 13E). Branches terete, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves imparipinnate, 1–5 pinnae, gradually increasing in number of pinnae along axillary branches, not conspicuously glandular, entire leaf (6–)13–45 mm long, (3–)6–35 mm wide; petiole winged, 2–8 mm long; rhachis segments winged, oval shaped or triangular with distal end wider, 4–10 mm long, 1–2 mm wide; lamina slightly to strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire and flat to recurved; midrib raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface with a sparse to moderate (rarely dense) stellate indumentum; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs (Fig. 13E); pinnae elliptic to oblanceolate, sessile to subsessile, petiolule to 1 mm long, with tip obtuse; terminal pinnae longer than lateral pinnae, 6–31 mm long, 3–12 mm wide; lateral pinnae 5–17 mm long, 2.5–8 mm wide. Inflorescence 1–3-flowered, with a dense stellate indumentum; peduncle 0.5–1 mm long; prophylls unifoliolate or pinnate, 1–5 mm long, to 1.5 mm wide; metaxyphylls minute; anthopodium 1–2 mm long. Sepals (Fig. 14N) ovate-deltoid, 3.5–5 mm long, 2–3 mm wide, not enlarging significantly with fruit, with tip acuminate; adaxial surface glabrescent; abaxial surface with a dense stellate indumentum. Petals pink to white, 6–11 mm long, 3–6 mm wide, enlarging slightly with mature fruit, with midvein raised abaxially; adaxial surface with a sparse to moderate simple indumentum becoming glabrous towards base; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, 2–2.5 mm long, the distal 0.5–1 mm prominently glandular (Fig. 14O); antepetalous filaments c. 1.5 mm long, the distal end glandular (Fig. 14P). Anthers monomorphic; anther apiculum minute or large and reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous. Gynoecium glabrous. Coccus 4–5.5 mm long, 2–3 mm wide, with a sparse to moderate indumentum (Fig. 14Q). Seeds black, shiny, 4–4.5 mm long, 2–2.5 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B). (Fig. 14 L–Q).

***Additional selected specimens (c. 20 collections examined)*: Queensland.** LEICHHARDT DISTRICT: Staircase Range, 22 km SE of Springsure, 24°13'S 148°14'E, Sep 1993, *Bean* 6910 (MEL); 20 km from Springsure towards Rolleston, 24°13'S 148°14'E, Sep 1992, *Duretto* 314–319 (314 - BRI, CANB, MEL, NSW, PERTH; 315 - AD, BRI, MEL, NSW; 316 - BRI, CANB, MEL, NSW; 317–318 - BRI, CANB, MEL, NSW; 319 - MEL); Hilltop, 9.35 km N of 1st Carnarvon Gorge turnoff & 125.35 km N of Injune, 24°32'S 148°31'E, Sep 1992, *Duretto* 320–324 & *Bayly* (320 - BRI, CANB, MEL, NSW, PERTH; 321 - BRI, MEL; 322–333 - BRI, CANB, MEL, NSW; 324 - AD, BRI, CANB, MEL, NSW); Stonecroft Caves [c. 24°55'S 149°33'E] N of Taroom, Jul 1958, *Gray* DMG4370 (BRI); Ceres holding, 10.8 km (by road) W of Rolleston-Injune Rd at Christmas Ck Crossing, Springsure 1:250000 (673917), 24°48'S 148°29?'E, Aug 1978, *Martensz* 1082A (CANB); Carnarvon Gorge, 25°0–'S 148°1–'E, Aug 1989, *Morley* s.n. (BRI); Near Dawson highway on Expedition Ra., 24°4–'S 149°0–'E, Aug 1988, *Phillips* s.n. (BRI); Rolleston Rd, c. 13 miles from Springsure township, Sep 1962, *Storey & Yapp* 211 (AD, BRI, CANB, MEL, NSW); Mt Moffatt section of Carnarvon National Park behind Tambo Bluff, 25°02'S 147°27'E, Sep 1986, *Thomas* 137 (BRI); Orion Downs, *Wuth* s.n. (MEL). MARANOA DISTRICT: 'The Tombs', Maranoa R, West Branch, Carnarvon NP, Apr 1981, *Blaxwell* 1892 (BRI, NSW); Mt Moffatt NP, 25°0–'S 147°5–'E., Sep 1988, *Hando* 454 (BRI); Mt Moffatt turnoff to Kenniffs Cave, 25°01'S 147°57'E, Sep 1986, *Williams* 86083 (BRI).

***Notes*:** *Boronia duiganiae* is not easily confused with any other taxon except *B. odorata* from which it can be distinguished by having pinnate leaves that usually have a moderately dense indumentum adaxially and hairs with longer rays (to 1 mm long as opposed to 0.1 mm long; Fig. 13E). Many specimens of it have previously been determined as *B. obovata* C.T White, which is endemic to the Blackdown Tableland area. *Boronia duiganiae* has ovate-deltoid sepals with a dense indumentum on the abaxial surface (the epidermis is not visible) which gives the sepal the light cream or tan colour, while *B. obovata* has narrowly deltoid sepals with a moderate indumentum on the abaxial surface (the abaxial surface is visible) and are dark brown.

***Distribution and ecology*:** Restricted to the Great Dividing, Carnarvon and Expedition

Ranges, south and south-west of Springsure and Rolleston (Fig. 12). Found growing in open woodland or forest on sandstone. Flowering material collected from February to November; fruiting material from September to November.

Conservation status: As the species is found in Carnarvon Gorge National Park and Mt Moffatt National Park, a ROTAP conservation code of 2RC- is appropriate.

Etymology: The species is named in honour of Dr Suzanne L. Duigan (1924–1993) in recognition for her long and distinguished career at the School of Botany, the University of Melbourne.

12. Boronia odorata Duretto, **sp. nov.** a *Boronia lanceolata* F.Muell. foliis juvenalibus trifoliolatis, floribus majoribus (petalis (4–)6–11 non 2–5.5(–7) mm longis) et filamentis hirsutis differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Bull Creek Gorge, 15 km W of 'Castlevale', 24°30'S 146°52'E, 3 September 1990, *A.R. Bean* 2194 (holo: BRI [AQ474979]; iso: NSW) (Fig. 14R–X).

Erect, much branched shrub to 2 m tall. Multiangular stellate hairs sessile, with 5–25 rays; rays unicellular, free, firm, straight, 0.05(–0.1) mm long, glossy, smooth, white to red-brown. Branches terete to slightly quadrangular in TS, not glandular, with little or no cork development, with a dense stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves simple at maturity but juvenile leaves trifoliolate for several nodes, not conspicuously glandular, subsessile to petiolate; petiole winged, 1–8 mm long; pinnae or unifoliolate leaf elliptic, with tip obtuse, strongly discolourous, paler beneath, lamina with palisade and spongy mesophyll; margins entire, flat to recurved (becoming revolute on drying); midrib raised abaxially, with tightly packed parenchyma with secondary thickening between midvein and abaxial epidermis, impressed adaxially; adaxial surface with a sparse to moderate stellate indumentum; abaxial surface with a dense indumentum of two hair types, a moderate layer of multiangular stellate hairs over a dense layer of peltate stellate hairs; juvenile leaves trifoliolate, initially glabrous, becoming more hirsute with each node until as hirsute as mature leaves; unifoliolate and terminal pinnae longer than lateral pinnae, (5–)12–40 mm long, (2–)4–8 mm wide; lateral pinnae 10–15 mm long, 2–4 mm wide. Inflorescence 1–3(–7)-flowered, with a dense stellate indumentum; peduncle 1–2 mm long, not deciduous with flower; prophylls unifoliolate, 1–4 mm long, 0.5–2 mm wide, with a dense stellate indumentum or as leaves; metaxyphylls minute; anthopodium 1–7 mm long. Sepals (Fig. 14T) ovate-deltoid, 2–4.5 mm long, 1–2.5 mm wide, not enlarging significantly with mature fruit, with tip acute to slightly acuminate; adaxial surface densely and minutely pubescent, becoming glabrous towards base; abaxial surface with a dense stellate indumentum. Petals pink to white, (4–)6–10 mm long, 4–6 mm wide, enlarging to 8–11 mm long and 5–7 mm wide with mature fruit, with midvein raised abaxially; adaxial surface moderately simple pubescent; abaxial surface with a moderate to dense stellate indumentum. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, 2–2.5 mm long, the distal c. 1 mm prominently glandular (Fig. 14U); antepetalous filaments c. 1.5 mm long, the distal end glandular (Fig. 14V). Antepetalous anther slightly larger than antesepalous anthers before dehiscence; anther apiculum large, reflexed, glabrous. Disc entire, not surrounding base of filaments, glabrous. Gynoecium glabrous. Coccus (4–)5.5–7 mm long, (2–)3–3.5 mm wide, glabrous or sparsely hirsute (Fig. 14W). Seeds black, shiny, 3.5–5 mm long, 2.5–3 mm wide, with adaxial side without a ridge; elaiosome yellow-white (Fig. 14X), surface at magnification tuberculate; tubercles erect, unicellular, 10–44 µm across, free, with surface smooth and anticlinal walls not visible (Fig. 10 A,B).

***Additional selected specimens (c. 40 collections examined)*: Queensland.** LEICHHARDT DISTRICT: 6 miles W of 'Mt Playfair' Station, 24°52'S 146°51'E, Oct 1964, *Adams* 1356 (AD, BRI, CANB); 1.5 miles S of Ball Ck & Robinson Ck junction, Glenhaughton holding, Oct 1974, *Clarkson* s.n. (BRI); 26 km WSW of Bauhinia Downs on the Dawson Hwy towards Rolleston, 24°39'S 149°02'E, Sep 1992, *Duretto* 288–292, *Bayly & Marsh* (288 - BRI, MEL, NSW; 289–291 - BRI, MEL; 292 - BRI, CANB, MEL, NSW); E of car park & camping area, Isla Gorge NP, 25°12'S 149°59'E, Sep 1992, *Duretto* 280–285 (280 - BRI, MEL; 281 - BRI, MEL; 282 - BRI,

CANB, MEL; 283 - MEL; 284–285 - BRI, MEL, NSW); Isla Gorge, c. 18 miles SW of Theodore, 25°09'S 149°57'E, Sep 1968, *Everist* 8033 (AD, BRI, CANB, NSW); Glenmore Gap, 13 km WSW of Theodore, 24°58'S 149°57'E, Mora Map 8848–969354, Sep 1986, *Forster* 2637 (BRI, CANB, MEL); 10 km S of Isla Gorge lookout, 37 km S by road from Theodore, 25°05'S 150°00'E, Jun 1971, *Johnson* 7203 & *Briggs* (BRI, NSW); Bauhinia Downs, 24°34'S 149°17'E, Feb 1968, *Jones* 3729 (CANB); W of Moura, Apr 1961, *Jones* 1814 (BRI); Watershed 23 miles ESE of Rolleston Township, 24°35'S 148°56'E, Aug 1961, *Lazarides & Storey* 112 (BRI, CANB, MEL, NSW). Warrego District: SW boundary of Chesterton NP, 26°13'S 147°20'E, Jul 1995, *Dollery* 84 (BRI); Mt Mobil Holding, 15–20 km W of Umberill Homestead, 26°14'S 147°25'E, Nov 1990, *Grimshaw* CHR20 (BRI). Maranoa District: SE of Surat, Thomby Range, May 1960, *Blake* 21293 (BRI, CANB, NSW, PERTH); Thomby Range, Glenmorgan-St. Georges Rd, Aug 1948, *Gordon* 115 (BRI); Claravale, c. 37 miles N of Mitchell on stony ridge, May 1962, *Johnson* 2434 (BRI, CANB).

Notes: Specimens of a trifoliolate and glabrous *Boronia* taxon that were thought to be a form of *B. glabra* by Stanley & Ross (1983) are probably juvenile specimens of *B. odorata*. Plants of this species from Isla Gorge and Thomby Range often have a more dense stellate indumentum on the adaxial surfaces of the leaves than do those of the typical form, and may, with further collections and research, be found to represent a distinct taxon. The majority of herbarium specimens of *B. odorata* seen have only simple leaves. Trifoliolate leaves are produced on the primary axis only, and then for only a few nodes. In *Boronia* sect. *Valvatae* this ontogenetic sequence also occurs in *B. pauciflora* W.Fitzg. (NW WA) (Duretto 1997), while some normally pinnate leaved species produce simple leaves as the plant ages, e.g. *B. keysii* (SE Qld), *B. ledifolia* (NSW, Vic.), *B. ruppii* Cheel (NSW), and *B. ternata* Endl. (SW WA) (Duretto 1995, submitted).

Boronia odorata can be distinguished from *B. duiganiae* by its simple mature leaves that have a sparse to moderate indumentum on the adaxial surface, and hairs with shorter rays (to 0.1 mm long rather than to 1 mm long). From *B. lanceolata* F.Muell. (NW Qld, N.T.) it may be distinguished by its larger flowers and pilose rather than glabrous staminal filaments (Duretto 1997), and from *B. jensziae*, *B. excelsa*, *B. foetida* and *B. bella* by its trifoliolate juvenile leaves and its sparse to moderate stellate indumentum, as apposed to being glabrous, on the adaxial surface of the leaves.

Distribution and ecology: Restricted to the Central Highlands of Queensland in an area approximately bounded by Springsure, Theodore, Surat, Mitchell and Tambo (Fig. 12). Found in open woodland on sandstone. Flowering material collected from February to October; fruiting material from April to November.

Conservation status: As *B. odorata* is widespread, though not evenly collected, and found in some conservation reserves, e.g. Isla Gorge and Expedition Range National Parks, it is not considered to be under threat.

Etymology: The specific epithet is derived from Latin, *odoratus* (smelling), and refers to the unpleasant (to some) tar/coffee odour of the leaves when crushed.

13. Boronia squamipetala Duretto, **sp. nov.** a *Boronia bowmanii* F. Muell. petalis majoribus (4–8 non 3–4 mm longis) indumento denso abaxialiter differt. **Typus:** Queensland. Cook District: 19 km from Peninsular development Rd on a track to Wolverton via the Cook Tin Mine, 13°21'S 143°3'E, 23 June 1993, *J.R. Clarkson* 10112 & *V.J. Neldner* (holo: MEL [MEL 2036781]; iso: BRI [AQ 621834], K, L, MBA, MEL [MEL 2036782]).

Boronia sp. "Massy Creek, Rocky River" (R. Coveny 7174) (Thomas & McDonald 1989).

Boronia sp. 3 (Massy Creek, Rocky River; R. Coveny 7174) (Briggs & Leigh 1996).

Boronia sp. (Massy Creek R.G. Coveny+ 7174) (Forster 1997).

Erect, much branched shrub to 1 m tall. Multiangular stellate hairs sessile, with 6–23+ rays; rays unicellular, fused and apressed, appearing peltate at times, firm, straight, 0.1–0.3(–0.5) mm long, glossy, smooth, white (Fig. 13F). Branches quadrangular in TS, not conspicuously glandular, with little or no cork development, with

a sparse to moderate stellate indumentum, becoming glabrous with age; decurrent leaf bases absent. Leaves imparipinnate, with 5–13 pinnae, not conspicuously glandular, 33–55 mm long, 12–20 mm wide, glabrescent or with a sparse indumentum, with hairs mainly on midrib; petiole winged, 6–15 mm long; rhachis segments winged, broader at distal end, 2–10 mm long, 1–3 mm wide; pinnae sessile, elliptic, slightly discolourous, paler beneath, lamina with palisade and spongy mesophyll, with tip acute; margins entire and flat to slightly recurved; midrib not or slightly raised abaxially, with tightly packed parenchyma between midvein and abaxial epidermis with secondary thickening in cells in the layer immediately above the epidermis only, slightly impressed adaxially; terminal pinnae longest, 8–20 mm long, 2–6 mm wide; lateral pinnae 3–13 mm long, 1–3 mm wide. Inflorescence (1-)3–7- flowered, with a sparse to moderate stellate indumentum; peduncle 1–2 mm long, woody, not deciduous with flower; prophylls linear, unifoliolate or pinnate, 1–3 mm long, 0.5–1 mm wide; metaxyphylls minute, to 0.5 mm long; anthopodium 2–6 mm long. Sepals ovate-deltoid, c. 2 mm long, c. 1 mm wide, not enlarging significantly with fruit, with tip acute; adaxial surface glabrous to glabrescent with few hairs along margin at tip; abaxial surface glabrescent or with a sparse to moderate stellate indumentum, hairs concentrated at base. Petals white to green, 4–7 mm long, 2.5–4 mm wide, enlarging to 6–8 mm long with mature fruit, with midvein not raised abaxially; adaxial surface glabrous or with a sparse simple indumentum, mainly at tip and along margins; abaxial surface with a moderate stellate indumentum with hairs concentrated along midrib. Stamen filaments bearing stiff simple hairs abaxially and on margins below glandular tip; antesepalous filaments clavate, tapering to anther connective, c. 1.5 mm long, the distal 0.5–0.75 mm prominently glandular; antepetalous filaments smooth, c. 1 mm long. Anthers monomorphic, appendage absent or minute to large and erect, glabrous. Disc entire, not surrounding base of filaments, glabrous. Gynoecium glabrous. Coccus 4–5.5 mm long, 2.5–3 mm wide, glabrous. Seeds black, shiny, 3–4 mm long, 1.5–2 mm wide, adaxial side without a ridge; elaiosome yellow-white; surface at magnification as with *B. odorata* (see Fig. 10A,B).

***Additional specimens examined*: Queensland.** Cook District: 4.2 km (2.6 miles) by road E of Wenlock R. towards Pascoe river on Iron Range Rd, 124 km by road NNW of Coen PO, 13°06'142°59'E, Sep 1975, *Coveny* 7174 & *Hind* (BRI, MELU, NSW, PERTH); 13 km along road to Leo Ck mine, McIlwraith Range, 13°43'S 143°12'E, Jun 1992, *Forster* 10098 (BRI, MEL); 3.5 km NNE Massy Ck crossing, Silver Plains Station, eastern fall of McIlwraith Range, 13°53'S 143°31'E, Jul 1993, *Forster* 13618 (CANB, MEL, NSW); 8 miles from Kennedy Rd on Leo Ck Track, 13°3–'S 143°2–'E, Jul 1968, *Gittens* 1781 (BRI, CANB, NSW); Bacon Ck, Archer R., 13°20'S 142°50'E, Jul 1972, *Hyland* 6239 (BRI, CANB, NSW, QRS); 10 miles N of Archer R. on Kennedy Rd, 13°25'S 142°50'E, Oct 1973, *Hyland* 7014 (BRI, QRS); Between Massy Ck & Rocky R. on Cape York Rd, 13°55'S 143°30'E, Sep 1971, *Hyland* 5515 (BRI, MEL, QRS); T.R. 14, Leo Ck Rd, 13°40'S 143°20'E, Sep 1972, *Irvine* 372 (QRS); Heathlands Pastoral Station on road between the slaughter yard & the Telegraph Line road, 11°47'S 142°30'E, May 1980, *Morton* 631 (BRI); 45 km N of Coen on Cape York Rd, Jun 1972, *Wrigley & Telford* NQ1710 (BRI, CANB).

***Notes*:** *Boronia squamipetala* is closely related to *B. bowmanii* (Duretto & Ladiges in press; Duretto 1995, submitted) from which it can be distinguished by its shorter and wider leaflets, and its larger petals that have a dense, rather than a sparse to moderate, peltate indumentum abaxially.

***Distribution and ecology*:** Occurs mainly in the Iron and McIllwraith Ranges in Cape York Penninsula (Fig. 12). Found in open woodland or forest and heath on loams, sand, or rock pavements. Flowering and fruiting material collected from May to October.

***Conservation status*:** Though this taxon was given a ROTAP conservation code of 2K by Briggs & Leigh (1996), because of its wider geographical range, a code of 3RC- is more appropriate. It is probably represented in Iron Range and McIllwraith Range National Parks.

***Etymology*:** The specific epithet is derived from Latin, *squamosus* (scaly) and *petala* (petals), and refers to the scaly appearance of the petals when viewed at low magnification. This scaly appearance is attributable to the fused rays of the densely packed hairs.

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Appendix 1. Voucher specimens for leaf anatomical data. Principal collector given only. All vouchers lodged at MEL. An '*' indicates that material was removed from a herbarium sheet and rehydrated. All other material was removed from pickled collections.

B. bella (Duretto 269); *B. duiganiae* (Duretto 320); *B. excelsa* (Forster 17248); *B. foetida* (Duretto 263); *B. forsteri* (Forster 11429); *B. hoipolloi* (Clarkson 10473); *B. jensziae* (Duretto 409); *B. odorata* (Duretto 282, 289); *B. palasepala* (Duretto 279); *B. quinkanensis* (Duretto 385, Clarkson 9619); *B. rosmarinifolia* (Duretto 102, 257); *B. splendida* (Duretto 337); *B. squamipetala* (Clarkson 10112).